

NASA SP-7500 (26)

March 1992

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MANAGEMENT

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BIBLIOGRAPHY FOR NASA MANAGERS (NASA)
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MANAGEMENT

A BIBLIOGRAPHY FOR NASA MANAGERS



National Aeronautics and Space Administration
Scientific and Technical Information Program
Washington, DC

1992

FOREWORD

AsManagement gathers together references to pertinent documents — reports, journal articles, books — that will assist the NASA manager to be more productive. Items are selected and grouped according to their usefulness to the manager as *manager*. A methodology or approach applied to one technical area may be worthwhile for a manager in a different technical field.

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TYPICAL REPORT CITATION AND ABSTRACT

NASA SPONSORED
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ACCESSION NUMBER → N91-13090*# GHG Corp., Houston, TX ← CORPORATE SOURCE
TITLE → ADANET DYNAMIC SOFTWARE INVENTORY (DSI)
PROTOTYPE COMPONENT ACQUISITION PLAN
AUTHOR → LIONEL HANLEY May 1989 19 p Revised Prepared for Houston Univ.,
Clear Lake, TX ← PUBLICATION DATE
(Contract NCC9-16) ← AVAILABILITY SOURCE
CONTRACT NUMBER → (NASA-CR-187309; NAS 1.26:187309) Avail: NTIS HC/MF A03
COSATI CODE → CSCL 09/2

A component acquisition plan contains the information needed to evaluate, select, and acquire software and hardware components necessary for successful completion of the AdaNET Dynamic Software Inventory (DSI) Management System Prototype. This plan will evolve and be applicable to all phases of the DSI prototype development. Resources, budgets, schedules, and organizations related to component acquisition activities are provided. A purpose and description of a software or hardware component which is to be acquired are presented. Since this is a plan for acquisition of all components, this section is not applicable. The procurement activities and events conducted by the acquirer are described and who is responsible is identified, where the activity will be performed, and when the activities will occur for each planned procurement. Acquisition requirements describe the specific requirements and standards to be followed during component acquisition. The activities which will take place during component acquisition are described. A list of abbreviations and acronyms, and a glossary are contained.

Author

TYPICAL JOURNAL ARTICLE AND ABSTRACT

NASA SPONSORED

ACCESSION NUMBER → A91-21219* Stanford Univ., CA. ← CORPORATE SOURCE
TITLE → DYNAMIC SYSTEMS-ENGINEERING PROCESS - THE
APPLICATION OF CONCURRENT ENGINEERING
AUTHORS → MICHAEL J. WISKERCHEN (Stanford University, CA) and R.
BRUCE PITTMAN (DYSE Corp., San Jose, CA) Engineering ← AUTHOR'S AFFILIATION
JOURNAL TITLE → Management Journal (ISSN 1042-9247), vol. 1, June 1989, p. 27-34.
(Contract NCC10-0001) ← PUBLICATION DATE
Copyright

A system engineering methodology is described which enables users, particularly NASA and DOD, to accommodate changing needs; incorporate emerging technologies; identify, quantify, and manage system risks; manage evolving functional requirements; track the changing environment; and reduce system life-cycle costs. The approach is a concurrent, dynamic one which starts by constructing a performance model defining the required system functions and the interrelationships. A detailed probabilistic risk assessment of the system elements and their interrelationships is performed, and quantitative analysis of the reliability and maintainability of an engineering system allows its different technical and process failure modes to be identified and their probabilities to be computed. Decision makers can choose technical solutions that maximize an objective function and minimize the probability of failure under resource constraints.

C.D.

MARCH 1992

01

HUMAN FACTORS AND PERSONNEL ISSUES

Includes Organizational Behavior, Employee Relations, Employee Attitudes and Morale, Personnel Management, Personnel Development, Personnel Selection, Performance Appraisal, Training and Education, Computer Literacy, Human Factors Engineering, Ergonomics, Human-Machine Interactions.

A91-10187*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, AL.

THE JOVE INITIATIVE - A NASA/UNIVERSITY JOINT VENTURE IN SPACE SCIENCE

F. SIX and R. CHAPPELL (NASA, Marshall Space Flight Center, Huntsville, AL). AIAA, Space Programs and Technologies Conference, Huntsville, AL, Sept. 25-27, 1990. 8 p. (AIAA PAPER 90-3840)

The JOVE (NASA/university Joint Venture in space science) initiative is a point program between NASA and institutions of higher education whose aim is to bring about an extensive merger between these two communities. The project is discussed with emphasis on suggested contributions of partnership members, JOVE process timeline, and project schedules and costs. It is suggested that NASA provide a summer resident research associateship (one ten week stipend); scientific on-line data from space missions; an electronic network and work station, providing a link to the data base and to other scientists; matching student support, both undergraduate and graduate; matching summer salary for up to three faculty participants; and travel funds. The universities will be asked to provide research time for faculty participants, matching student support, matching summer salary for faculty participants, an instructional unit in space science, and an outreach program to pre-college students. L.K.S.

A91-14161*# National Aeronautics and Space Administration, Washington, DC.

COSMOS, AN INTERNATIONAL CENTER FOR ADVANCED STUDIES

IURII RYZHOV, OLEG ALIFANOV (Moskovskii Aviatsionnyi Institut; International Center for Advanced Studies COSMOS, Moscow, USSR), STANLEY SADIN (NASA, Office of Aeronautics, Exploration and Technology, Washington, DC), and PAUL COLEMAN (California, University, Los Angeles). IAF, International Astronautical Congress, 41st, Dresden, Federal Republic of Germany, Oct. 6-12, 1990. 7 p. (IAF PAPER 90-507) Copyright

The concept of Cosmos, a Soviet operating center for aerospace activities, is presented. The main Cosmos participants are the Institute for Aerospace Education, the Institute for Research and Commercial Development, and the Department of Space Policy and Socio-Economic Studies. Cosmos sponsors a number of educational programs, basic research, and studies of the social impact of space-related technologies. B.P.

A91-16899

DEMOGRAPHICS OF PRINCIPAL INVESTIGATORS INVOLVED IN NASA-FUNDED RESEARCH

S. ALAN STERN, RONALD KONKEL, and RADFORD BYERLY, JR. (Colorado, University, Boulder) Space Policy (ISSN 0265-9646), vol. 6, Nov. 1990, p. 350-353. refs Copyright

This report presents the findings of a study of 2875 principal investigators identified through a database maintained by NASA's Office of Space Science and Applications. It was found that there will be a major 'retirement wave' involving the loss of approximately 1200 of these experienced scientists within the next 15 years. A manpower crisis can apparently only be averted by reversing the exodus from space science that occurred after the end of the Apollo program. Author

A91-17001

DYNAMICS OF CONTROL SYSTEMS [DINAMIKA SISTEM UPRAVLENIIA]

V. I. ZUBOV, ED. Leningrad, Izdatel'stvo Leningradskogo Universiteta, 1989, 208 p. In Russian. For individual items see A91-17002 to A91-17009.

Copyright

Papers are presented on mathematical methods for the analysis of control systems for technical plants and manufacturing processes. Particular attention is given to the mechanics of controlled space flight, the design of automatic control systems, flexible automated complexes, control applications in biomedical research, and chemical technology for the production of new types of materials. B.J.

A91-17645#

V-22 GOVERNMENT TEST PILOT TRAINER PROGRAM OVERVIEW

JOHN D. MCGRILLIS and W. RUSTY LOWRY (U.S. Navy, Naval Air Test Center, Patuxent River, MD) AHS, Annual Forum and Technology Display, 46th, Washington, DC, May 21-23, 1990, Paper. 10 p. Research sponsored by the U.S. Navy.

The V-22 Government Test Pilot Trainer (GTPT) was developed to train government developmental and operational test pilots in as realistic an environment as possible. The GTPT is the first simulator to use the generic hardware and software of the Naval Air Test Center's manned flight simulator (MFS). The MFS uses a modular simulation design which allows various simulator cockpits to be switched in and out of any one or two engineering work stations, a 40 foot diameter fixed base dome, or a six degree of freedom motion base. The GTPT was developed to use these assets for V-22 government pilot training. This report presents an overview of the MFS facility, the V-22 GTPT simulator, and the training accomplished using the simulator. Author

A91-19109#

THE MIT SPACE GRANT PROGRAM

DANIEL E. HASTINGS (MIT, Cambridge, MA) AIAA, Aerospace Sciences Meeting, 29th, Reno, NV, Jan. 7-10, 1991. 3 p. (AIAA PAPER 91-0035) Copyright

A review is presented of the joint NASA, MIT and aerospace industry Space Grant Program. The national Space Grant Programs have been established with the following objectives: (1) to establish a national network of universities with capabilities and interests in space and related fields, (2) to encourage cooperative programs among universities, government and aerospace industry, (3) to encourage interdisciplinary training, research and public service

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programs related to aerospace, (4) to recruit and train professionals for careers in aerospace, and (5) to promote a strong science mathematics and technology education base from elementary through university levels. The status of this program at MIT and how these objectives are being met are discussed. R.E.P.

A91-22305

THE WEIGHT IMPROVEMENT PROCESS AS AN ELEMENT OF WEIGHT CONTROL

KELVIN H. KLINK (Boeing Advanced Systems, Seattle, WA) SAWE, Annual International Conference, 48th, Alexandria, VA, May 22-24, 1989. 30 p.

(SAWE PAPER 1878) Copyright

The Weight Improvement Process presently proposed as an organizational basis for the dynamic encouragement of weight control efforts in the course of aircraft design phases emphasizes the emergence of numerous weight-reduction ideas from employees through clear recognition by management personnel of such contributions. Such recognition is enforced through the issuance of award plaques and cash certificates graded in accordance with the magnitude of the weight-reduction contribution made by the employee. Estimates are presented for the costs of a representative employee recognition system. O.C.

A91-31023

CONCURRENT ENGINEERING - THE CHALLENGE FOR THE 90S

CAROL A. MARLIN (Unisys Corp., Blue Bell, PA) and KEVIN M. SMITH IN: NAECON 90; Proceedings of the IEEE National Aerospace and Electronics Conference, Dayton, OH, May 21-25, 1990. Vol. 3. New York, Institute of Electrical and Electronics Engineers, Inc., 1990, p. 1313-1323. refs

Copyright

A conceptual framework is presented that aids the generation of system requirements sufficient to support the concurrent design activities of avionic engineers, software engineers, knowledge engineers, human factors engineers, and instructional system designers. The recommended design approach for concurrent engineering is given. First, structure the problem comprehensively, independently of technology, and in such a way as to be understandable to the design team members. Second, formulate solution concepts that clearly map to the problem structure. The problems being encountered in avionics design are discussed. It is shown that a multifunctional design team the members of which all work from a common requirements source document could be a major step in implementing an effective solution. I.E.

A91-34911* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, CA.

HUMAN FACTORS AND INFORMATION TRANSFER

ALFRED T. LEE (NASA, Ames Research Center, Moffett Field, CA) IN: Human error avoidance techniques; Proceedings of the 2nd Conference, Herndon, VA, Sept. 18, 19, 1989. Warrendale, PA, Society of Automotive Engineers, Inc., 1989, p. 43-48.

(SAE PAPER 892607) Copyright

Key problem areas in the management and transfer of information in the National Airspace System, contributing to human errors are identified. Information-management aspects supporting the user's ability to assess prevailing situations accurately with adequate time to make an informed decision are considered. The relationship between judgment biases and requirements for managing weather information is illustrated by examining such hazardous weather phenomena as microbursts and windshears. The system of air-ground communication relying almost exclusively on voice transmissions is discussed, and recommendations in the areas of communications procedures and technology development are provided. V.T.

A91-34913

AMERICAN AIRLINES' PILOT HIRING CRITERIA

WILLIAM A. JAMES (American Airlines, Inc., Dallas, TX) IN: Human error avoidance techniques; Proceedings of the 2nd

Conference, Herndon, VA, Sept. 18, 19, 1989. Warrendale, PA, Society of Automotive Engineers, Inc., 1989, p. 57-59.

(SAE PAPER 892609) Copyright

An approach aimed at enhancements of individual's performance as pilot-in-command as his career progresses to the captain position is outlined, and characteristics desirable for future captains, including strong career motivation toward the field of aviation, ability to solve problems by logical reasoning, mature personality free from neurotic symptoms, and ability to perform well under stress are listed. A centralized pilot-selection process consisting of four phases is described. In phase one, the personnel department screens applications for basic qualifications; in phase two, the selected applicants are given a personal interview; in phase three, a test battery designed for screening applicants for the desirable characteristics is administered; and in phase four, the applicants are rank ordered based on a composite score derived from the various elements of the process. V.T.

A91-49858

IMPLEMENTATION OF NEW TECHNOLOGY - A BOEING PERSPECTIVE

CHET EKSTRAND (Boeing Commercial Airplanes, Seattle, WA) IN: Managing the modern cockpit; Proceedings of the 3rd Human Error Avoidance Techniques Conference, Dallas, TX, Dec. 4, 5, 1990. Warrendale, PA, Society of Automotive Engineers, Inc., 1990, p. 7-13.

(SAE PAPER 902341) Copyright

The last decade has seen the introduction of many high-technology airplanes into the air transportation system. These high-tech airplanes have typically brought flight decks with highly integrated Flight Management Systems and a host of challenges in terms of effectively utilizing the new technologies. Training is the area that offers the greatest potential for improvement in how the high-tech flight deck is operated. A system for definition of knowledge/skill development levels, training medium allocation, cognitive task definition, and knowledge/skill maintenance interval analysis, are some of the enhancements proposed in this paper.

Author

A91-49859

IMPLEMENTATION OF NEW TECHNOLOGY - A UNITED AIRLINE'S PERSPECTIVE

BOB SMITH (United Airlines, Chicago, IL) IN: Managing the modern cockpit; Proceedings of the 3rd Human Error Avoidance Techniques Conference, Dallas, TX, Dec. 4, 5, 1990. Warrendale, PA, Society of Automotive Engineers, Inc., 1990, p. 15-18.

(SAE PAPER 902342) Copyright

The FAA's Special Federal Aviation Regulation 58, promulgated on September 26, 1990, allows air carriers to develop unique pilot-qualification programs independently of prior regulations and artificial constraints, following a rigorous instructional system-design process. It is hoped that this emphasis by the new Advanced Qualification Programs (AQPs) on airline creativity will lead to superior crew member training. AQPs will be mission-oriented, proficiency-based, analytically developed, and empirically validated. AQPs must include cockpit resource management training and evaluation, line operational simulations, and specialized training for instructors. O.C.

A91-50999

HUMAN FACTORS FOR PILOTS

ROGER G. GREEN, MELANIE JAMES, DAVID GRADWELL (RAF, Institute of Aviation Medicine, Farnborough, England), HELEN MUIR (Cranfield Institute of Technology, England), and ROGER L. GREEN Research supported by Cranfield Institute of Technology and RAF. Aldershot, England and Brookfield, VT, Avebury Technical, 1991, 146 p. refs

Copyright

This handbook attempts to provide a reasonably comprehensive but concise outline of the available human factors knowledge about flying in the hope that it will prove useful and interesting to the practicing pilot. Particular attention is given to the following topics:

basic aviation physiology and health maintenance; basic aviation psychology; stress, fatigue, and their management; and the social psychology and ergonomics of the flight deck. B.J.

A91-51025

THE DEVELOPMENT OF TECHNOLOGY FOR COLLECTIVE TRAINING - SIMNET, A CASE HISTORY

EARL A. ALLUI (Institute for Defense Analyses, Alexandria, VA) Human Factors (ISSN 0018-7208), vol. 33, June 1991, p. 343-362. refs
Copyright

The technical history of simulator networking (SIMNET) development is summarized, and lessons learned that could contribute to the success of future efforts to develop training technologies and systems, particularly for collective training, are identified. The implications and challenges of SIMNET for the human factors and training technology communities are discussed. R.E.P.

N91-12202# Naval Postgraduate School, Monterey, CA. AN ANALYSIS OF THE EFFECT OF FREQUENCY OF TASK PERFORMANCE ON JOB PERFORMANCE MEASUREMENT M.S. Thesis

RICK L. REECE Mar. 1990 69 p
(AD-A225304) Avail: NTIS HC/MF A04 CSDL 05/9

The effect is explored of frequency of performance on the Congressionally mandated Job Performance Measurement, specifically the Marine Corps' portion of the study. The initial portion of the project involved the hands-on performance testing of the infantry specialties. The use is validated of the general technical (GT) composite of the Armed Services Vocational Aptitude Battery (ASVAB) test as a predictor of performance in the infantry specialty and to provide recommendations to revise training priorities. The approach in analyzing the problem included the following: (1) computing the correlation between aptitude and performance, then investigating any degrading or moderating effect that frequency might have on this relationship; (2) an investigation into the performance of high aptitude personnel versus low aptitude personnel across frequency categories; and (3) the relative effect of frequency on the maintenance of proficiency in each task. The use was validated of the GT composite as an effective predictor for hands on performance by performing analysis of variance. An interesting result was the determination that frequency is the major predictor for performance based tasks requiring continual practice for the maintenance of skill levels, while recency is the major factor in predicting tasks that are more knowledge based and require the recall of detailed procedures. GRA

N91-12208# Dynamics Research Corp., Wilmington, MA. HARDWARE VERSUS MANPOWER COMPATIBILITY METHODOLOGY. VOLUME 1: OVERVIEW AND MANAGER'S GUIDE Final Report, Sep. 1986 - Mar. 1988

DAVID HERLIHY, JANE BONDARUK, GUY NICHOLAS, ROBERT GUPTILL, and JOHN PARK May 1990 163 p
(Contract MDA903-86-C-0298; DA PROJ. 2Q2-63007-A-793) (AD-A225122; ARI-RP-90-19A-VOL-1) Avail: NTIS HC/MF A08 CSDL 05/9

The Army Hardware vs. Manpower (HARDMAN) Comparability Methodology (HCM) is a six-step process for determining a weapon system's manpower, personnel, and training (MPT) requirements. It provides a structured approach for early MPT estimation based on comparability analysis, an analytic system that uses knowledge about similar existing systems and technological growth trends to project the MPT requirements of proposed new systems. The HCM's six interrelated steps are Systems Analysis, Manpower Requirements Analysis, Personnel Pipeline Analysis, Training Resource Requirements Analysis, Impact Analysis, and Tradeoff Analysis. The HCM has been successfully applied to a range of weapons systems, including air, armor, artillery, infantry, air defense, command and control, and intelligence systems. The Product Improvement Program for HCM made major revisions to the existing HCM Guide. The scope has been expanded to include several new areas; existing procedures have been revised, refined, and

clarified; and the entire Guide has been rewritten to achieve greater clarity, consistency, and completeness. This volume addresses the planning and conducting of an HCM analysis. Procedures are provided for determining the analysis scope and estimating the resources required for the analysis. Preparation of the quality assurance plan and establishment of the consolidated database are explained. The relationship between HCM results and various Army MPT documents is also discussed. GRA

N91-12567# Wichita State Univ., KS. Inst. for Aviation Research.

THE ENHANCEMENT OF AIR TRAFFIC CONTROL SAFETY THROUGH PRE-HIRE UNIVERSITY BASED TRAINING PROGRAMS

BRENT D. BOWEN In AIAA, Proceedings of the 1990 AIAA/FAA Joint Symposium on General Aviation Systems p 82-107 May 1990

Avail: NTIS HC/MF A17

A potential means to enhance air traffic control safety through increased human performance capabilities of the nation's Air Traffic Controller Work Force is proposed. Research data was gathered from colleges and universities participating in the Federal Aviation Administration's (FAA) Airway Science Program. The Federal Aviation Administration initiated the Airway Science Program in 1983 to facilitate the development of collegiate education programs as a means of meeting future FAA manpower needs, primarily in the area of air traffic control. The FAA realized that it must update the skill level of its work force to adapt to an increasingly technical and automated environment. This is a major undertaking in that the upgrading of this work force will require the attrition of over 45,000 individuals. Currently, 32 institutions of higher education participate in the Airway Science Program. These institutions represent many established colleges and universities which offer aviation educational programs developed by the FAA. Research data gathered through this study should allow the Federal Aviation Administration to better understand the potential of the Airway Science Program to enhance air traffic safety. This program allows the availability of a means of pre-hire training through a baccalaureate degree program which stresses technical and managerial capabilities. This will provide an air traffic control work force with the increased human performance capabilities which are required to staff the increasingly difficult systems of our rapidly developing National Airspace System. Author

N91-13880# Idaho National Engineering Lab., Idaho Falls. Human Factors Research Unit.

THE HUMAN FACTORS OF QUALITY AND QA IN R AND D ENVIRONMENTS

SUSAN G. HILL 1990 9 p Presented at the 17th Annual Conference of the American Society for Quality Control, Tucson, AZ, 9-12 Sep. 1990

(Contract DE-AC07-76ID-01570) (DE91-001913; EGG-M-90048; CONF-9009153-3) Avail: NTIS HC/MF A02

Achieving quality is a human activity. It is therefore important to consider the human in the design, development and evaluation of work processes and environments in an effort to enhance human performance and minimize error. It is also important to allow for individual differences when considering human factors issues. Human Factors is the field of study which can provide information on integrating the human into the system. Human factors and quality are related for the customer of R and D work, R and D personnel who perform the work, and the quality professional who oversees the process of quality in the work. DOE

N91-17546# Idaho National Engineering Lab., Idaho Falls. EXAMINING HUMAN-SYSTEM INTERACTIONS: THE HSYS (HUMAN SYSTEM) METHODOLOGY

SUSAN G. HILL, JERRY L. HARBOUR, CHRISTOPHER SULLIVAN, and BRUCE P. HALLBERT 1990 5 p Presented at the 34th Human Factors Society Conference, Orlando, FL, 8-12 Oct. 1990 (Contract DE-AC07-76ID-01570)

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(DE91-006150; EGG-M-89088; CONF-9010155-4) Avail: NTIS HC/MF A01

The human-system methodology (HSYS) is a model-based methodology developed to examine the many factors which influence human-system interactions. HSYS is built around a linear model of human performance, called the Input-Action model, which describes five sequential steps: Input Detection, Input Understanding, Action Selection, Action Planning, and Action Execution. HSYS is structured in an hierarchical tree which presents a logical structure for examining potential areas where human performance, hardware or other system components are less than adequate. The HSYS tree consists of five major branches which correspond to the five major components of the Input-Action model. Initial validation was begun by studying accident reports via HSYS and identifying sources of error. The validation process has continued with accident investigations in operational settings.

DOE

**N91-18099# Human Factors Solutions, Rockville, MD.
FUTURE NORTH AMERICAN AIR TRAFFIC CONTROL
SYNERGY HUMAN FACTORS SOLUTION Final Technical
Report**

PAMELA MYERS Dec. 1989 17 p

(Contract F19628-89-C-0099)

(AD-A229255) Avail: NTIS HC/MF A03 CSCL 17/7

This innovative research effort was proposed in response to the challenge of integrating the lessons learned in developing the American and Canadian airspace systems into the planning process for an interoperable, trans-century, North American airspace system. The intent was to identify opportunities for increasing efficiencies, reciprocal benefits, and cooperation between the U.S. and Canada which would result in a proposed functional organizational matrix. This strawman organization would provide DoD with a framework for mutual airspace management gains between the U.S. and Canada.

GRA

N91-20997# Air Force Inst. of Tech., Wright-Patterson AFB, OH.

**AIR FORCE INFORMATION MANAGEMENT (IM): A 1990
SNAPSHOT AND 1995 FUTURE LOOK AT AIR FORCE IM
NEEDS AND PREFERRED EDUCATION/TRAINING
APPROACHES M.S. Thesis**

RICHARD T. MCGHEE Dec. 1990 192 p

(AD-A229695; AFIT/GIR/LSM/90D-6) Avail: NTIS HC/MF A09 CSCL 05/1

This research investigated 37 training topics which were of interest to Air Force (AF) information managers, Air Force Specialty Code 70XX. The topics were grouped into the following seven information resource related clusters: (1) computer operating systems, (2) data communications, (3) Air Force Standard Systems (PDOS, RAMS, and PCIII), (4) information resource management concepts, (5) AF/IM career field issues, (6) computer hardware, and finally, (7) computer software. Twenty-four graduates of the AF Institute of Technology's (AFIT) Information Resource Management program were asked to provide their perceptions of AF information managers (IMs) current (1990) and needed (1995) knowledge/skill levels on each topic. Telephone interviews with the respondents indicated that, relative to the 37 topics discussed, the graduates perceived a significant difference between current and needed knowledge/skill levels in practically all topic areas. The respondents also provided recommendations on effective and practical training methods/approaches for closing knowledge/skill level gaps. Finally, the graduates provided feedback relative to the effectiveness of the IRM program.

GRA

**N91-28028# National Academy of Sciences - National Research
Council, Washington, DC. Office of Scientific and Engineering
Personnel.**

**RECRUITMENT, RETENTION, AND UTILIZATION OF FEDERAL
SCIENTISTS AND ENGINEERS Final Report, 1 Jul. 1989 - 31
Jul. 1990**

A. K. CAMPBELL and L. S. DIX Aug. 1990 187 p Sponsored by Carnegie Commission on Science, Technology and Government,

NY

(PB91-179366; ISBN-0-309-04330-1; LC-90-62688) Avail: NTIS HC/MF A09 CSCL 05/1

The report is the result of an exploratory study of the organizational and institutional processes that may affect the ability of federal government to attract and retain scientists and engineers. The study committee conducted a literature review; discussed relevant issues with Alan T. Watterman Awardees, directors of 22 federal laboratories, and college placement officers; commissioned papers; and met with representatives of approximately 25 federal agencies to determine factors influencing recruitment, retention, and utilization of scientists and engineers; organizational and decision-making processes that relate to them; and mechanisms undertaken to maintain a stable work force of scientists and engineers. The report focuses on the Central Personnel Data File (CPDF) maintained by the Office of Personnel Management (OPM), factors affecting the federal government's ability to recruit and retain scientists and engineers, specific efforts by OPM and individual federal agencies to enhance such recruitment and retention, science and engineering activity undertaken under a variety of scenarios, and the impact of political appointees on the fulfillment of federal science and engineering (S&E) work.

Author

N91-28096*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

**JPL INITIATIVE ON HISTORICALLY BLACK COLLEGES AND
UNIVERSITIES**

LEW ALLEN, PAUL FORTE, JR., and MARTIN H. LEIPOLD In Alabama A & M Univ., NASA-HBCU Space Science and Engineering Research Forum Proceedings p 247-253 1989

Avail: NTIS HC/MF A23 CSCL 05/9

Executive order number 12320 of September 15, 1981, established a program designed to significantly increase the participation of historically black colleges and universities (HBCU's) in Federal programs. Because of its geographical remoteness and position as a contractor operated center, JPL had not participated in grant and training programs with the HBCU's. In recognition of JPL's responsibility to the national commitment on behalf of the historically black colleges and universities, an initiative with effective, achievable guidelines and early progress for a better and more productive interaction between JPL and the HBCU's is described. Numerous areas of interaction with the historically black colleges and universities have been identified and are being implemented. They have two broad objectives: research interactions and faculty/student interactions. Plans and progress to date for each specific area are summarized.

Author

N91-28267*# Vitro Corp., Washington, DC.

**LAUNCH OPERATIONS MANPOWER YESTERDAY, TODAY
AND TOMORROW**

GEORGE OJALEHTO In NASA, Washington, Space Transportation Propulsion Technology Symposium. Volume 3: Panel Session Summaries and Presentations p 1303-1312 May 1991

Avail: NTIS HC/MF A99 CSCL 22/4

The manpower to accomplish spacecraft launch operations was analyzed. It seems that the ratio of personnel to launches was much higher in the beginning of the space program than in later years. The analysis was performed to see why the operational efficiency was better then than now and how that efficiency can be reattained.

E.R.

**N91-29066# Virginia Polytechnic Inst. and State Univ., Blacksburg.
Management Systems Labs.**

**A SELECTION TOOL FOR CHOOSING THE BEST
PARTICIPATIVE PROBLEM-SOLVING TECHNIQUE**

J. F. KEELING, III, H. A. KURSTEDT, JR., and J. E. HUGHES 1990 3 p

(Contract DE-FG02-88DP-48058)

(DE91-012421; DOE/DP-48058/T11) Avail: NTIS HC/MF A01

The primary purpose is to provide managers and group facilitators with a tool for selecting the best technique(s) to help a group solve a problem. The selection tool was created by matching

available techniques to problem component examples using a contour map. The secondary purpose is to: (1) describe (by example) three components of a problem that requires a group to solve, and (2) describe available techniques for group problem solving. DOE

N91-29068# Edgerton, Germeshausen and Grier, Inc., Idaho Falls, ID.

THE HUMAN SIDE OF VALUE ENGINEERING

J. WIXSON and H. J. HEYDT 1991 11 p Presented at the SAVE International Conference, Kansas City, May 1991 (Contract DE-AC07-76ID-01570) (DE91-012817; EGG-M-90540; CONF-9105167-2) Avail: NTIS HC/MF A03

This paper addresses people, pride and performance and their interrelationship with the Value Engineering (VE) technique. It explores the importance of people for the successful application of the technique. It discusses leadership skills, verbal and non-verbal communication, team member recognition and participation, knowledge of right and left brain characteristics and the part each play in the job plan leading to the successful integration of philosophy and techniques to create change and improve performance. DOE

N91-29070# Virginia Polytechnic Inst. and State Univ., Blacksburg, Management Systems Labs.

HOW TO INCREASE MEETING EFFECTIVENESS AND EFFICIENCY

M. GRUNAU and H. A. KURSTEDT, JR. 1991 3 p (Contract DE-FG02-88DP-48058) (DE91-012420; DOE/DP-48058/T13) Avail: NTIS HC/MF A01

A model is presented which was adapted from control theory to gain insight into the dynamics of meetings. The system controller and feedback sensor in the model are related to the role of the facilitator in meetings. By drawing parallels between the control theory model and the adapted model for meetings, I came up with an operational definition of a group facilitator and derived the following hypothesis: Providing facilitators with information about group members prior to the meeting will improve their effectiveness and efficiency in facilitating the meeting. Such information, for example, could include the group members' personality types measured with the Myers-Briggs Type Indicator or their conflict modes measured through the Thomas-Kilmann Conflict Mode Instrument. DOE

N91-29071# Virginia Polytechnic Inst. and State Univ., Blacksburg.

WHY ENGINEERS MUST KNOW AND MANAGE ORGANIZATIONAL CULTURE

H. A. KURSTEDT, JR., L. A. MALLAK, E. M. HOWARD, and P. S. KURSTEDT 1990 5 p (Contract DE-FG02-88DP-48058) (DE91-012425; DOE/DP-48058/T4) Avail: NTIS HC/MF A01

The engineering manager's success is being judged more and more on qualitative measures concerning the human elements of their work. These new measures require engineers to become as skilled and at ease with the tools, methods, and techniques for qualitative issues as they are with more traditional quantitative tools, methods, and techniques. To achieve success toward these qualitative measures demands nothing short of a new way of thinking, indeed a new culture embodying new values and traditions. Engineering managers must use culture change mechanisms along with their other management tools so they can better understand and manage culture. They must view concepts such as just-in-time, total quality management, and continuous performance improvement as integral to culture change efforts; these concepts and corresponding programs require an underlying culture to create an environment for change. Engineers who want to manage and change culture and communicate these changes must become comfortable with hoopla and symbolism to add drama and life to their words and plans. Engineers must understand the elements of culture, become effective communicators, and master the tools, methods, and techniques of culture change. DOE

N91-30042# Wichita State Univ., KS. National Inst. for Aviation Research.

MARKETING FOR COLLEGIATE AVIATION EDUCATION

PHILLIPS W. GOODELL, BRENT D. BOWEN, and MARLA J. HOLT 1991 34 p (NIAR-91-18) Avail: NTIS HC/MF A03

The increased reliance on marketing and its ability to solve pressing concerns has allowed it to overcome its opposition and become an integral part of higher education. Educational marketing is a competitive tool which must now be utilized for mere survival in today's dynamic world. An educational institution must present its specialty niche in the marketplace much the same as business. Marketing offers many advantages other than student recruitment. Its principles can be applied to the selection of faculty, positioning within the marketplace (academic rankings) and in the resource allocation process. Marketing has been successfully applied to higher education as evidenced by increasing enrollments in a period of decreasing supply of traditional college age students. Forecasting student enrollment in a new academic program at a university is similar to forecasting the demand for a new product or service in a business environment. Marketing has legitimized its necessity and purpose in the academic arena. The application of basic marketing principles will only enhance the success of collegiate aviation education programs. Author

N91-30605# Midwest Research Inst., Golden, CO. Solar Energy Research Inst.

SCIENCE PROJECTS IN RENEWABLE ENERGY AND ENERGY EFFICIENCY

Jul. 1991 130 p (Contract DE-AC02-83CH-10093) (DE91-002195; SERI-SP-220-4426) Avail: NTIS HC/MF A07

First, the book is written for teachers and other adults who educate children in grades K-12. This allows us to include projects with a variety of levels of difficulty, leaving it to the teacher to adapt them to the appropriate skill level. Second, the book generally focuses on experimental projects that demonstrate the scientific method. We believe that learning the experimental process is most beneficial for students and prepares them for further endeavors in science and for life itself by developing skills in making decisions and solving problems. Although this may appear to limit the book's application to more advanced students and more experienced science teachers, we hope that some of the ideas can be applied to beginning science classes. In addition, we recognize that there are numerous sources of nonexperimental science activities in the field and we hope this book will fill a gap in the available material. Third, we've tried to address the difficulties many teachers face in helping their students get started on science projects. By explaining the process and including extensive suggestions of resources - both nationally and locally - we hope to make the science projects more approachable and enjoyable. We hope the book will provide direction for teachers who are new to experimental projects. And finally, in each section of ideas, we've tried to include a broad sampling of projects that cover most of the important concepts related to each technology. Additional topics are listed as 'one-liners' following each group of projects. DOE

N91-31988# Sandia Labs., Albuquerque, NM.

IMPROVING MANAGERS' EFFECTIVENESS

M. R. JAMES 1991 9 p Presented at the IEEE USA's Biennial Careers Conference, Denver, CO, 10 Oct. 1991 (Contract DE-AC04-76DP-00789) (DE91-016405; SAND-91-1784C; CONF-9110171-1) Avail: NTIS HC/MF A02

Upward Feedback is a program that gives employees and opportunity to anonymously provide their manager with feedback concerning the manager's job performance. It is an opportunity for managers to receive confidential feedback evaluating the implementation of corporate values and management behaviors as perceived by those who work for them. This feedback can come from employees who report directly to the manager, that is, one level below them (referred to as direct reports), or from those two reporting levels below them (referred to as skip-level reports).

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Managers then share information with their employees in feedback meetings and develop action plans to address areas of concern. Sandia National Laboratories has developed and implemented an Upward Feedback Pilot Program and follow up survey. This paper discussed the program and the lessons learned. DOE

02

MANAGEMENT THEORY AND TECHNIQUES

Includes Management Overviews and Methods, Decision Theory and Decision Making, Leadership, Organizational Structure and Analysis, Systems Approaches, Operations Research, Mathematical/Statistical Techniques, Modelling, Problem Solving, Management Planning.

A91-10019*# National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, FL.

A TEST MANAGER'S PERSPECTIVE OF A TEST CONCEPT FOR A HEAVY LIFT VEHICLE

JOHN I. PARGEON, JR. (NASA, Kennedy Space Center; USAF, Operational Test and Evaluation Center, Cocoa Beach, FL) AIAA, Space Programs and Technologies Conference, Huntsville, AL, Sept. 25-27, 1990. 6 p. (AIAA PAPER 90-3557)

The development of a test concept is a significant part of the advanced planning activities accomplished for the Initial Operational Test and Evaluation (IOT&E) of new systems. A test concept is generally viewed as a description, including rationale, of the test structure, evaluation methodology and management approach required to plan and conduct the IOT&E of a program such as a new heavy lift launch vehicle system. The test concept as presented in this paper is made up of an operations area, a test area, an evaluation area, and a management area. The description presented here is written from the perspective of one test manager, and represents his views of a possible framework of a test concept using examples for a potential IOT&E of a heavy lift launch vehicle. Author

A91-10136#

AN OVERVIEW OF RISK MANAGEMENT TECHNIQUES, METHODS AND APPLICATION

THOMAS E. SHAW (Lockheed Sanders, Inc., Nashua, NH) AIAA, Space Programs and Technologies Conference, Huntsville, AL, Sept. 25-27, 1990. 15 p. refs (AIAA PAPER 90-3767) Copyright

An overview of various approaches, methods, and management processes associated with the risks of both traditional and extreme nature is presented. The risk identification and risk analysis steps of risk management are emphasized. Risk assessment methods such as probabilistic risk assessment (PRA) and qualitative rating methods are seen in perspective. The critical importance of the risk awareness of the program on the part of the team leadership and its individual members is emphasized. B.P.

A91-18091

DISCUSSION FORUM - THE EFFECTS OF ELECTRONIC RECORDKEEPING ON THE HISTORIC RECORD OF THE U.S. GOVERNMENT

PATRICIA S. ROBERTS and SARAH T. KADEC Government Information Quarterly (ISSN 0740-624X), vol. 7, no. 4, 1990, p. 383-387. Copyright

The National Archives and Records Administration sponsored a study of the effects of electronic recordkeeping on the historic record of the Federal government in 1987-1988. The possible erasing/loss of documents is studied based on an input from representatives of state governments, professional and trade associations, business, industry, and academia, solicited for that purpose and compared with the literature on electronic records. It

is concluded that the use of technology remains decentralized/haphazard and that most users of the electronic records are not aware of their responsibilities. In order to improve the existing practices, further research is recommended. B.P.

A91-18092

THE FREEDOM OF INFORMATION ACT NEEDS NO AMENDMENT TO ENSURE ACCESS TO ELECTRONIC RECORDS

PATTI A. GOLDMAN (Public Citizen Litigation Group, Washington, DC) Government Information Quarterly (ISSN 0740-624X), vol. 7, no. 4, 1990, p. 389-402. refs Copyright

The contents and significance of the Freedom of Information Act (FOIA) are discussed as they apply to access to electronic information (EI). It is pointed out that most disputes that have arising over the application of the Act to EI concern four FOIA standards including the definition of 'agency records'; the agency's search responsibilities; the agency's duty to segregate and release nonexempt portions of a record; and the agency's obligation to produce information in a particular form. It is pointed out that the FOIA establishes principles that aim to minimize burdens upon agencies while assuring access to information and suggested that these principles can and should be regularly applied to requests for EI. It is argued that additional legislation to ensure access to EI may prove to be not only redundant but impeditive and that Congressional energy would be better spent overseeing agency practices to ensure that access to EI is provided to the public in accordance with the FOIA. L.K.S.

A91-19889

THE CAUSES OF PROJECT FAILURE

JEFFREY K. PINTO (Maine, University, Orono) and SAMUEL J. MANTEL, JR. (Cincinnati, University, OH) IEEE Transactions on Engineering Management (ISSN 0018-9391), vol. 37, Nov. 1990, p. 269-276. Research supported by the University of Cincinnati. refs

Copyright

A study was conducted of 97 projects identified as failures by the projects' managers or parent organizations. Using the project implementation profile, a set of managerially controllable factors are identified as associated with project failure. The factors differed according to three contingency variables: (1) the precise way in which failure was defined; (2) the type of project, and (3) the stage of the project in its life cycle. Implications for project management and for future research on failed projects are discussed. The results demonstrated empirical justification for a multidimensional construct of project failure, encompassing both internal efficiency and external effectiveness aspects. The fact that the critical factors associated with failure depended on the way in which failure is defined suggests that it is necessary to know considerably more about how project managers define failure (and success) and, indeed, how the parent organization makes judgments on the matter. I.E.

A91-29690#

SYSTEMS MANAGEMENT OF TESTING AS AN INTEGRAL EFFORT OF TOTAL QUALITY MANAGEMENT

GEORGE J. VLAY (Loral Aerospace Corp., Palo Alto, CA) IN: Aerospace Testing Seminar, 12th, Manhattan Beach, CA, Mar. 13-15, 1990, Proceedings. Mount Prospect, IL, Institute of Environmental Sciences, 1990, p. 1, 2.

A91-29692#

ELIMINATING WASTE IN THE TEST PROCESSES

SANDRA J. FRAZELLE (Rockwell International Corp., Seal Beach, CA) IN: Aerospace Testing Seminar, 12th, Manhattan Beach, CA, Mar. 13-15, 1990, Proceedings. Mount Prospect, IL, Institute of Environmental Sciences, 1990, p. 11, 12.

The management approaches used in an effort to reduce waste during the testing phase of an aerospace manufacturing program (for the Navstar GPS satellite) are briefly discussed and illustrated with diagrams and flow charts. Particular attention is given to the

application of Total Quality Management principles in a process environment, techniques for acquiring accurate process data in a timely fashion, and strategies for overcoming employee resistance. T.K.

A91-29693#

DEVELOPMENT OPERATIONS - A TQM PROCESS

HAROLD CROY and JOHN O. ECKHOLT (Boeing Aerospace and Electronics, Seattle, WA) IN: Aerospace Testing Seminar, 12th, Manhattan Beach, CA, Mar. 13-15, 1990, Proceedings. Mount Prospect, IL, Institute of Environmental Sciences, 1990, p. 13-15.

The application of Total Quality Management (TQM) methods in an aerospace development program is briefly characterized. The approach involves the formation of 8-12-member Product Development Teams; the members have different areas of expertise but all receive extensive training in such TQM skills as quality awareness and improvement, process management, statistical process control, Taguchi methods, team leadership, and departmental task analysis. The teams are organized before proposals are submitted, when possible, and are responsible for requirements development, design, fabrication, test, delivery and postdelivery support of the specified product. T.K.

A91-29694#

TOTAL QUALITY MANAGEMENT - WHAT DOES IT MEAN TO AEROSPACE ENGINEERS?

GEORGE J. THIELEN (USAF, Aeronautical Systems Div., Wright-Patterson AFB, OH) IN: Aerospace Testing Seminar, 12th, Manhattan Beach, CA, Mar. 13-15, 1990, Proceedings. Mount Prospect, IL, Institute of Environmental Sciences, 1990, p. 17-20. refs

This paper outlines the origins and basic principles of the Total Quality Management (TQM) concept and its significance to engineers engaged in aerospace design, development and testing. Drawing on results of a recent AIAA survey, current U.S. engineering perceptions of TQM and 'quality of engineering design' are summarized and apparent weaknesses in the process of product development are identified. Changes in customer quality expectations and solicitations are also discussed, together with some recommendations for improving product reliability, producibility, and value through integrated design, development and testing activities. Author

A91-30959

PREPARING THE ENTERPRISE FOR TOTAL QUALITY MANAGEMENT - DEFINING, PLANNING, AND EMPOWERING

ROBERT F. BACHERT (USAF, Wright-Patterson AFB, OH) and GLEN R. GALLAWAY (Joshua Group, Inc., Beavercreek, OH) IN: NAECON 90; Proceedings of the IEEE National Aerospace and Electronics Conference, Dayton, OH, May 21-25, 1990. Vol. 2. New York, Institute of Electrical and Electronics Engineers, Inc., 1990, p. 812-818. refs

Copyright

The authors discuss the need for an enterprise to begin the development of a TQM (total quality management) process by better understanding its structures, functions, and performance in the context of a total/integrated operation. From this knowledge-base the enterprise can set objectives, define strategies, and plan an effective application of the TQM process and the use of resources that match an enterprise's strengths and weaknesses. The methodology, techniques, and tools for analyzing, planning, and changing management that empower an enterprise to effectively apply TQM are presented and discussed. It is noted that when planning and developing a new enterprise special care should be taken to design-in TQM. I.E.

A91-31036* National Aeronautics and Space Administration, Washington, DC.

THE NASA TREND ANALYSIS PROGRAM

J. LARRY CRAWFORD (NASA, Trend Analysis Div., Washington, DC) and ROBERT WEINSTOCK (Vitro Corp., Washington, DC) IN: 1990 Annual Reliability and Maintainability Symposium, Los

Angeles, CA, Jan. 23-25, 1990, Proceedings. New York, Institute of Electrical and Electronics Engineers, Inc., 1990, p. 25-30.

Copyright

The four main areas of the NASA trend analysis program (problem/reliability, performance, supportability, and programmatic trending) are defined and illustrated with examples from Space Shuttle applications. Emphasis is on the programmatic-trending component of the program and several of the statistical techniques used. Also described is the NASA safety, reliability, maintainability, and quality assurance management information center, used to focus management attention on key near-term launch concerns and long-range mission trend issues. I.E.

A91-31046#

BARRIERS TO TOTAL QUALITY MANAGEMENT IN THE DEPARTMENT OF DEFENSE

HAL A. RUMSEY and PHILLIP E. MILLER (USAF, Institute of Technology, Wright-Patterson AFB, OH) IN: 1990 Annual Reliability and Maintainability Symposium, Los Angeles, CA, Jan. 23-25, 1990, Proceedings. New York, Institute of Electrical and Electronics Engineers, Inc., 1990, p. 95-99.

Reliability and maintainability are discussed as subsets of the assurance sciences. Total Quality Management (TQM) covers all of the assurance sciences, with significant emphasis on the human and organizational systems underlying all production processes. When the Air Force Logistics Command initiated TQM, a number of challenges had to be overcome to achieve the full potential of the program. These barriers included a lack of worker motivation, opposition of existing management, and lack of effective communication. I.E.

A91-31047#

R&M 2000 PROCESS - A CORNERSTONE TO THE TOTAL QUALITY MOVEMENT

JAMES F. GUZZI (USAF, Systems Command, Andrews AFB, MD) IN: 1990 Annual Reliability and Maintainability Symposium, Los Angeles, CA, Jan. 23-25, 1990, Proceedings. New York, Institute of Electrical and Electronics Engineers, Inc., 1990, p. 106-108. refs

The U.S. DOD Total Quality Management (TQM) campaign to support continuous process improvement is discussed. Reliability, maintainability, and producibility (RM&P) are discussed as key building blocks of TQM and the continuous quality improvement of weapon systems. This relationship supports the strategic importance of R&M 2000 in the TQM movement and clearly supports the R&M 2000 goals. The strategic relationship of the R&M 2000 process is reviewed. To demonstrate the conceptual relationships defined by the R&M 2000 process and TQM, the R&M quality team concept is used. The R&M quality team concept is the first TQM initiative to support the R&M 2000 process. The concept has been successfully used in the design of the C-17A airlifter. I.E.

A91-39723#

SOME CONSIDERATIONS ON ORGANISING REQUIREMENTS FOR SYSTEMS MANAGEMENT

R. J. STEVENS (ESA, European Space Research Institute, Frascati, Italy) ESA Journal (ISSN 0379-2285), vol. 15, no. 1, 1991, p. 35-48. refs

Copyright

Project management demands a stable, abstract view of the complete system from beginning to end - for planning, monitoring, and verification. The methodology should allow management-by-exception, providing a clear view of potential problems is retained. Such a system can only be based on system requirements, and the management information system must therefore also be based on requirements. However, requirements must be thoroughly structured for this approach to be at all possible. While requirements are most familiar during the early creation and the last verification stages, their status can be a measure of progress throughout the whole life cycle of the project. The theory and practice of using such systems on space-related projects is

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covered. This theory has been derived by abstracting and modeling experience in projects. Author

A91-40704*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, AL.

MANAGEMENT OF A CFD ORGANIZATION IN SUPPORT OF SPACE HARDWARE DEVELOPMENT

L. A. SCHUTZENHOFER, P. K. MCCONNAUGHEY, H. V. MCCONNAUGHEY, and T. S. WANG (NASA, Marshall Space Flight Center, Huntsville, AL) IN: AIAA Computational Fluid Dynamics Conference, 10th, Honolulu, HI, June 24-27, 1991, Technical Papers. Washington, DC, American Institute of Aeronautics and Astronautics, 1991, p. 21-31. refs
(AIAA PAPER 91-1529) Copyright

The management strategy of NASA-Marshall's CFD branch in support of space hardware development and code validation implements various elements of total quality management. The strategy encompasses (1) a teaming strategy which focuses on the most pertinent problem, (2) quick-turnaround analysis, (3) the evaluation of retrofitable design options through sensitivity analysis, and (4) coordination between the chief engineer and the hardware contractors. Advanced-technology concepts are being addressed via the definition of technology-development projects whose products are transferable to hardware programs and the integration of research activities with industry, government agencies, and universities, on the basis of the 'consortium' concept. O.C.

A91-41692#

THE PROCESS TEAM CONCEPT

AL HAUSSMANN and BOB DEPHILIPPIS (Aerojet, Propulsion Div., Sacramento, CA) AIAA, SAE, ASME, and ASEE, Joint Propulsion Conference, 27th, Sacramento, CA, June 24-26, 1991. 5 p.
(AIAA PAPER 91-2065) Copyright

The organizational responsibilities and operational aspects of the Process Team concept are presented. The overall objective of the Process Team is to reduce the time to complete an operation or to reduce the span time of a product by utilizing cost-effective total quality management principles and practices while meeting customer requirements. Organizations that have properly implemented this process team concept have achieved improved quality, safety, cost, and schedule performance while experiencing improved morale. R.E.P.

A91-42458

AUDITING R&D PLANNING

GEORGE J. TITUS (Temple University, Philadelphia, PA) and MATTHEW J. LIBERATORE (Villanova University, PA) IEEE Transactions on Engineering Management (ISSN 0018-9391), vol. 38, May 1991, p. 171-177. refs
Copyright

A five-step procedure for auditing R&D planning and budgeting processes is presented. A major difference between this and standard approaches is the use of a follow-up mail questionnaire to validate the findings and identify major differences of opinion which can be addressed during implementation. The method itself was developed during the completion of nine case studies and nearly 100 personal interviews of R&D and business executives. A series of R&D planning norms are used to direct attention toward issues which should be addressed during the audit. An example of a successful audit which used this five-step procedure is also presented. The method and ideas presented have and can be successfully applied to a wide range of industrial research and engineering organizations. I.E.

A91-47775

IMPLEMENTING A CORPORATE SOFTWARE DEVELOPMENT METHODOLOGY

SABINO CACUCCI and GLEN HOSACK (Space Software Italia, Italy) IN: The management of large software projects in the space industry; Colloquium, Toulouse, France, Oct. 16-18, 1990, Proceedings. Toulouse, France, Cepadues-Editions, 1991, p. 287-295. refs
Copyright

The formation of a European software firm and the software development methodology that was selected are described, and specific examples of how this methodology has influenced the firm's operations are presented. Consideration is given to the life-cycle approach, comprehensive system engineering, inspection and certification, integrated management controls, and structured software build cycle. Two software development methodologies are compared. L.M.

A91-48616

THE TRAINING ENTERPRISE - A VIEW FROM THE TOP

ROBERT F. BACHERT, TENNY A. LINDHOLM, and DONALD D. LYTLE (USAF, Aeronautical Systems Div., Wright-Patterson AFB, OH) SAE, Aerospace Technology Conference and Exposition, Long Beach, CA, Oct. 1-4, 1990. 11 p. refs
(SAE PAPER 901943) Copyright

The Air Force is developing methodology for the development of 'total' training systems/enterprises. The methodology is based on the concepts of the systems approach and adaptive evolutionary systems. This paper discusses these concepts, the methodology, and their application to the planning, design, and evaluation of training systems. Areas emphasized include the application of the Total Quality Management, needs/requirements analysis, and the Instructional Systems Development (ISD) process. Author

A91-54149

RISK MANAGEMENT AT ESA

H. SCHIMROCK (ESA, Risk Management Office, Paris, France) ESA Bulletin (ISSN 0376-4265), no. 67, Aug. 1991, p. 95-98.
Copyright

The paper describes the systematic assessment of the risks within ESA programs as well as possible remedies and consequences. Policy applications are described as they relate to site and infrastructure protection, computer security, liability and contractual arrangements, and different types of insurance. Recommendations from the risk-management arena include safety measures and compliance studies, protections against industrial espionage, impact assessments related to exposures, and the protection afforded by insurance. Compliance with the recommendations can increase confidence in ESA activities and protect member countries from unexpected losses and unforeseen financial requirements. The risk-management organization at the ESA is a part of the management system and can positively affect the budget and production of the organization. C.C.S.

N91-10048*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, CA.

INDUSTRY LIAISON SECTION IMPLEMENTATION PLAN

STEPHEN LAKOWSKIE Sep. 1990 81 p
(Contract NAS2-11555)
(NASA-CR-177569; A-90303; NAS 1.26:177569) Avail: NTIS HC/MF A05 CSCL 01C

The Industry Liaison Section is a new function of the Army/NASA Aircrew-Aircraft Integration (AAAI) Program that is intended to bridge an existing gap between Government developers (including contractors) and outside organizations who are potential users of products and services developed by the AAAI Program. Currently in its sixth year, the Program is experiencing considerable pull from industry and other government organizations to disseminate products. Since the AAAI Program's charter is exploratory and research in nature, and satisfying proper dissemination requirements is in conflict with the rapid prototyping approach utilized by the design team, the AAAI Program has elected to create an Industry Liaison Section (ILS) to serve as the Program's technology transfer focal point. The process by which the ILS may be established, organized and managed is described, including the baseline organizational structure, duties, functions, authority, responsibilities, relations and policies and procedures relevant to the conduct of the ILS. Author

N91-10793* Research Inst. for Advanced Computer Science, Moffett Field, CA.

THE INTEGRATED SCHEDULING SYSTEM: A CASE STUDY IN PROJECT MANAGEMENT

PETER C. BISHOP, DAVID B. LEARNED, and CISSY A. YOES
Oct. 1989 117 p
(Contract NCC9-16)
(NASA-CR-187261; NAS 1.26:187261) Avail: NTIS HC/MF A06
CSCL 05A

A prototype project management system was developed for the Level III Project Office for the Space Station Freedom. The main goal was to establish a framework for the Space Station Project Office whereby Project and Office Managers can jointly establish and review scheduled milestones and activities. The objective was to assist office managers in communicating their objectives, milestones, schedules, and other project information more effectively and efficiently. Consideration of sophisticated project management systems was included, but each of the systems had limitations in meeting the stated objectives. Author

N91-10794* Research Inst. for Advanced Computer Science, Moffett Field, CA.

APPLIED TECHNOLOGY CENTER BUSINESS PLAN AND MARKET SURVEY

ROBERT F. HODGIN and ROBERTO MARCHESINI 1990
68 p
(Contract NCC9-16)
(NASA-CR-187259; NAS 1.26:187259) Avail: NTIS HC/MF A04
CSCL 05B

Business plan and market survey for the Applied Technology Center (ATC), computer technology transfer and development non-profit corporation, is presented. The mission of the ATC is to stimulate innovation in state-of-the-art and leading edge computer based technology. The ATC encourages the practical utilization of late-breaking computer technologies by firms of all variety.

Author

N91-11596* Defense Logistics Agency, Alexandria, VA.
DEFENSE LOGISTICS AGENCY INFORMATION RESOURCES MANAGEMENT (IRM) NEAR-TERM PLANNING DOCUMENT FY 1990-1992

May 1990 226 p
(PB90-238494) Avail: NTIS HC/MF A11 CSCL 05B

The document was prepared to provide Information Resources Management (IRM) program direction and to serve as a baseline for development of the Defense Logistics Agency (DLA) IRM Five Year Plan. It is a decision document which reflects the objectives and strategies of the IRM program and is the cornerstone on which all other IRM planning, resourcing and acquisition documents are based. The document is organized into chapters dealing with the major segments of DLA IRM activities such as automated information systems (AISs) and technology. Taken together they represent both the IRM program vision of the future and near-term projects that are the building blocks that will make that future vision a reality.

GRA

N91-12386* Navy Personnel Research and Development Center, San Diego, CA.

READINGS ON MANAGING ORGANIZATIONAL QUALITY Final Report, Apr. - Nov. 1989

NIDA BACKAITIS, ed. (University of Southern California, Los Angeles.) and HAROLD H. ROSEN, ed. May 1990 327 p
Sponsored by Office of the Under Secretary of the Navy, Washington, DC
(AD-A224888; NPRDC-TN-90-19) Avail: NTIS HC/MF A15
CSCL 05/1

New management philosophies are examined which are helping to bring about the transformation of American industry and that are enabling firms to meet competitive challenges successfully with novel strategies. The new management philosophy is based on assumptions that better reflect the ground rules of today's global economy than do the assumptions upon which much of current management practice is based. The role is emphasized of

leadership at various levels of the organization in bringing about effective organizational response to the new competitive challenge. It describes changes in policies, in organizational structure, in the management of relationships with customers and suppliers, and in the management of relationships within organizations that will help them to create and sustain competitive advantage. GRA

N91-12387* Defense Logistics Analysis Office, Alexandria, VA.
TQM TOOLS AND STUFF: THE INDOCTRINATION OF TYRONE NEWBLOOD

Jun. 1990 57 p
(AD-A225208) Avail: NTIS HC/MF A04 CSCL 05/1

This booklet is essentially a reprint of the Rome Air Development Center's Basic Training in TQM (Total Quality Management) Analysis Techniques. Thanks to the kind permission of Mr. Anthony Coppola, the author of the booklet, the DLA TQM office has been able to make very minor changes to his work to put a logistics flavor in this version.

GRA

N91-14075 Texas Univ., Austin.
INFORMATION SYSTEMS SUPPORTED END-USER INTERACTION: IMPACTS ON INTER- AND INTRA-ORGANIZATIONAL CONNECTIVITY AND COOPERATIVE BEHAVIOR Ph.D. Thesis

FRANCIS WOOLMIN WU 1989 250 p
Avail: Univ. Microfilms Order No. DA9017007

An Executive Information Systems Leadership Model is proposed with emphasis on executive involvement in facilitating internal and external connectivity and interactivity to achieve organizational and social integration. Four components of this leadership models are explained: (1) cooperative culture; (2) multi-dimensional social structure; (3) motivation for communication across groups; and (4) catalysts which stimulate collective action. Four hypotheses are derived from this model to propose the integrative role of the executive and its interaction with information technology. These four hypotheses are tested in all cases with substantial empirical support. The integrative role of the executive information systems leadership, the dynamics of social interaction within and across organizations, and the changes in organizational and social connectivity, participative culture, and cooperative behavior are examined to better understand the impacts of end-user computing from organizational and social integration perspective.

Dissert. Abstr.

N91-14891 Pittsburgh Univ., PA.
STRATEGIC UTILIZATION OF INFORMATION RESOURCES: A CONTINGENCY APPROACH Ph.D. Thesis

RAJIV SABHERWAL 1989 249 p
Avail: Univ. Microfilms Order No. DA9019380

The strategic utilization of information resources, an important but little researched area, is investigated using an information system application as the unit of analysis. The research model includes three levels of the environment (industry, organizational, and information system), the application's characteristics, the decision-making process preceding the application, and the application's success. Hypotheses were proposed for the relationships among these dimensions, using three reference disciplines-strategic decision-making, organizational buying behavior, and innovation adoption. Questionnaire data from 85 senior executives (19.02 percent response rate) of Fortune 1000 companies were analyzed. The analysis supports most research hypotheses as well as the overall model, except the hypotheses concerning the relationship between the environment and the application's characteristics. Hierarchical cluster analysis, used to develop an empirical taxonomy of the decision-making processes, produced five clusters-planned, IS influenced, user-influenced, fluid, and incremental. Discriminant analysis showed that the environmental characteristics discriminate between these decision-making process clusters-the environment correctly classified the decision-making process in 49.38 percent cases. The cluster means for the environmental characteristics, and the application's characteristics and success, were compared to examine the differences among the five clusters. Having

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systematically utilized knowledge from several reference disciplines, this empirical research on strategic utilization of information resources should help practice and provide a useful foundation for future research. Dissert. Abstr.

N91-15225# Tsukuba Space Center, Ibaragi (Japan).
MANAGEMENT AND OPERATION OF ENVIRONMENTAL TEST FACILITY COMPLEX

T. OKUDA, M. TSUCHIYA, K. NOZAWA, T. YOSHIDA, K. TOMITA, and M. KINOSHITA (Advanced Engineering Services Co. Ltd., Tsukuba City, Japan) / In ESA, International Symposium on Environmental Testing for Space Programmes: Test Facilities and Methods p 95-98 Sep. 1990
Copyright Avail: NTIS HC/MF A23

The Spacecraft Integration and Test Building (SITE) was built by the National Space Development Agency of Japan (NASDA) in 1989, and is designed to perform developmental tests on future use large scale test objects such as large satellites which would be launched by H-2 rockets, space stations, space planes and so on. Many kinds of facilities are confined to one building with a fully sufficient test area which results in high test performance and parallel test plans availability. The operation and management of the SITE building and facilities are collectively controlled from an operation and control room. Test operations are carried out by contractors and supervised by NASDA to ensure safety and reliability. The management and operation of SITE are described. ESA

N91-17831# Institute for Defense Analyses, Alexandria, VA.
A SURVEY OF TOTAL QUALITY MANAGEMENT (TQM) RESOURCE CENTERS Final Report
JAMES LESTER and SARAH H. NASH Mar. 1990 59 p
(Contract MDA903-89-C-0003)
(AD-A229218; AD-E501310; IDA-D-745) Avail: NTIS HC/MF A04 CSDL 05/1

This document describes a study of various models of Total Quality Management Resource Centers that have been established, and is intended to assist in the development of a design for a Department of Defense (DoD) TQM Resource Center. The Institute for Defense Analyses (IDA) surveyed eight organizations with TQM Resource Centers for their designs and operations. While a precise set of organizations models did not emerge from the data collected, three critical design issues did: the level of activity, the degree of centralization, and the philosophy of operation. Moreover, the data from the study did not argue for or against the establishment of a DoD TQM Resource Center, nor was IDA asked to make this determination. Although the organizations surveyed have successfully used TQM Resource Centers to improve quality, at least two organizations who were winners of the prestigious Baldrige Award for Quality did not invest in TQM Resource Centers. Further study is required by the DoD to determine whether a DoD TQM Resource Center is needed and who its customers would be. GRA

N91-19954# Royal Military Coll. of Science, Shrivenham (England).

THE IMPACT OF THE NEW MANAGEMENT STRATEGY ON SENIOR OPERATIONAL COMMANDERS AT GROUP LEVEL WITHIN ROYAL AIR FORCE STRIKE COMMAND M.S. Thesis

J. MCHALE Dec. 1989 151 p
(REPT-89SDM/MCHALE/03-MDA; ETN-91-98856) Copyright Avail: NTIS HC/MF A08

The government's introduction of a financial management initiative has affected the way all government departments do business. The Ministry of Defence for its part is introducing a new management strategy to meet the objectives of the aforementioned initiative. A study which examines how this strategy will be implemented within the Royal Air Force Strike Command group structure is presented. A methodological approach is adopted to analyze how the groups currently operate. Some consideration is given as to how the groups will need to operate when the new management strategy is implemented in April 1992. A number of alternative options for changing the organizational structure of the

Command under the strategy are offered. They are considered from both a theoretical and practical viewpoint before an option is proposed. The implementation of the proposed option is discussed. ESA

N91-20067# Federal Aviation Administration, Washington, DC.
Aviation System.

CAPITAL INVESTMENT PLAN

Dec. 1990 345 p

Avail: NTIS HC/MF A15

This is the Federal Aviation Administrations (FAA) first annual aviation system capital investment plan (CIP). The CIP describes the policies and strategies that the FAA will pursue in addressing key concerns of the National Airspace System (NAS). The plan addresses safety, efficiency, traffic demands, aging equipment and facilities, and airspace use. It creates a foundation for evolution of the existing NAS through use of new technologies and development of new products obtained from continuing research. The following topics are covered: (1) a summary of the overall plan; (2) remaining original NAS plan projects; (3) requirements that expand, relocate, or consolidate existing facilities/equipment; (4) projects that refurbish structures, replace obsolete equipment, or relocate facilities to maintain service, improve effectiveness, or reduce cost; (5) projects that support logistics, provide for personnel training, and manage the information and human resource aspects of NAS modernization; and (6) new projects which, if implemented, are expected to add significant new capabilities to the NAS.

Author

N91-20982# Defense Logistics Agency, Alexandria, VA.
Operations Research and Economic Analysis Office.

MULTIPLE FORECASTING TECHNIQUES Final Report

BENEDICT C. ROBERTS Dec. 1990 56 p
(AD-A230600; DLA-91-P90053) Avail: NTIS HC/MF A04 CSDL 05/1

The Defense Logistics Agency (DLA) currently employs the Standard Automated Material Management System (SAMMS) under a mode which forecasts demand for all quarterly forecast demand (QFD) items through the use of a single forecasting technique. This approach for these QFD items has been shown in previous analysis to result in long term forecasting errors. The result of these errors in forecasts is that DLA has consistently maintained higher safety levels which has contributed to the presence of excess on-hand stocks. Consequently, the overall thrust of this analysis has been to enhance the forecasting methodology of SAMMS by exploring alternative forecasting techniques which would have the potential to enhance the accuracy of long term forecasts. The project has succeeded in the development of a multiple forecasting methodology which has the capability to select the most appropriate forecasting technique for each QFD item. GRA

N91-22195*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

FLIGHT MISSION CONTROL FOR MULTIPLE SPACECRAFT

ROBERT E. RYAN / In ESA, Ground Data Systems for Spacecraft Control p 37-41 Oct. 1990 Sponsored by NASA, Washington
Copyright Avail: NTIS HC/MF A99 CSDL 09/6

A plan developed by the Jet Propulsion Laboratory for mission control of unmanned spacecraft is outlined. A technical matrix organization from which, in the past, project teams were formed to uniquely support a mission is replaced in this new plan. A cost effective approach was needed to make best use of limited resources. Mission control is a focal point operations and a good place to start a multimission concept. Co-location and sharing common functions are the keys to obtaining efficiencies at minimum additional risk. For the projects, the major changes are sharing a common operations area and having indirect control of personnel. The plan identifies the still direct link for the mission control functions. Training is a major element in this plan. Personnel are qualified for a position and certified for a mission. This concept is more easily accepted by new missions than the ongoing missions. ESA

N91-22267*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

OPERATIONS ENGINEERING: TIME FOR A NEW PARADIGM

ESKER K. DAVIS and WILLIAM N. JENSEN *In* ESA, Ground Data Systems for Spacecraft Control p 489-492 Oct. 1990
Sponsored by NASA, Washington
Copyright Avail: NTIS HC/MF A99 CSCL 12/2

Operations engineering, a new approach to operational effectiveness and efficiency, is described. It is engineering for operations excellence, a bona fide engineering effort focused on the operations phase, but functioning throughout the entire system life cycle. The main objective of operations engineering is productivity: built in productivity, not just the 'make it more productive' type of enhancement that usually occurs after complex systems become operational. Operations engineering designs and integrates people, processes, procedures, hardware, software, and facilities to perform in the most effective and efficient manner, continually improving the technology of operations and enhancing desirable operational attributes. Like systems engineering, operations engineering has its own domain, with characteristics, attributes, functions, and responsibilities. Some of the characteristics of this field of research are summarized. ESA

N91-24463*# Center for Space and Advanced Technology, Fairfax, VA.

MICROGRAVITY STRATEGIC PLANNING EXERCISE Final Report

RICHARD HALPERN, JIM DOWNEY, and HAROLD HARVEY 15 Apr. 1991 109 p
(Contract NAS8-38669)
(NASA-CR-184167; NAS 1.26:184167) Avail: NTIS HC/MF A06 CSCL 22/1

The Center for Space and Advanced Technology supported a planning exercise for the Microgravity Program management at the Marshall Space Flight Center. The effort focused on the status of microgravity work at MSFC and elsewhere with the objective of preparing a goal-oriented strategic planning document which could be used for informational/brochure purposes. The effort entailed numerous interactions and presentations with Field Center programmatic components and Headquarters personnel. Appropriate material was consolidated in a draft format for a MSFC Strategic Plan. Author

N91-24599*# National Aeronautics and Space Administration, Marshall Space Flight Center, Huntsville, AL.

AN EVALUATION OF THE TOTAL QUALITY MANAGEMENT IMPLEMENTATION STRATEGY FOR THE ADVANCED SOLID ROCKET MOTOR PROJECT AT NASA'S MARSHALL SPACE FLIGHT CENTER M.S. Thesis - Tennessee Univ.

HARRY F. SCHRAMM and KENNETH W. SULLIVAN May 1991 120 p
(NASA-TM-103533; NAS 1.15:103533) Avail: NTIS HC/MF A06 CSCL 14/4

An evaluation of the NASA's Marshall Space Flight Center (MSFC) strategy to implement Total Quality Management (TQM) in the Advanced Solid Rocket Motor (ASRM) Project is presented. The evaluation of the implementation strategy reflected the Civil Service personnel perspective at the project level. The external and internal environments at MSFC were analyzed for their effects on the ASRM TQM strategy. Organizational forms, cultures, management systems, problem solving techniques, and training were assessed for their influence on the implementation strategy. The influence of ASRM's effort was assessed relative to its impact on mature projects as well as future projects at MSFC. Author

N91-24639# Rolls-Royce Ltd., Derby (England).

A ROLE MODEL FOR QUALITY MANAGEMENT IN FINITE ELEMENT ANALYSIS

JOHN BARLOW *In* AGARD, Analytical Qualification of Aircraft Structures 12 p Apr. 1991
Copyright Avail: NTIS HC/MF A08; Non-NATO Nationals requests available only from AGARD/Scientific Publications Executive

Many engineering companies use a quality management system

to ISO 9001 as a means of controlling quality and standards in their products and operations. The National Agency for Finite Element Methods and Standards has recently issued a quality systems supplement on the application of ISO 9001 to the use of finite element analysis in the design and validation of engineering products. A role model is presented for a quality system designed to fulfill the requirements of that document. Quality aspects of the following topics are covered: management of the analysis operation; acquisition; development and verification of software; qualification and documentation of analysis methods; project analysis; and education and training of personnel. Comments are included, based on experience of implementing finite element quality procedures.

Author

N91-25900# Technische Univ., Delft (Netherlands).

PROFILES IN MANAGEMENT: RELATIONS IN THE MARKET AND BUSINESS PLACE Ph.D. Thesis

WILLEM GERRIT MONHEMIUS 1990 305 p
(ETN-91-99436) Avail: NTIS HC/MF A14

The control of business systems is addressed. This is seen against a background of a society in continual flux. The aspects that play a role in this respect are investigated, not as independent, unconnected elements, but in their mutual relation. No common tenet was found and reasons for this are given. The aim is to unfold the problems and indicate the passage from entrepreneurship to running a company on full stream. It is found that on the basis of experience, the heads of small companies, who have had practice at their schools, often have a more businesslike attitude and frame of mind than those who have followed an appropriate training. ESA

N91-26993# Air Force Systems Command, Griffiss AFB, NY.

A ROME LABORATORY GUIDE TO BASIC TRAINING IN TQM ANALYSIS TECHNIQUES

ANTHONY COPPOLA Mar. 1991 57 p
(Contract AF PROJ. 9993)
(AD-A233855; RL-TR-91-29) Avail: NTIS HC/MF A04 CSCL 05/1

Total Quality Management (TQM) is a DoD initiative for continuously improving performance at every level, in every area of DoD responsibility. Implementing this philosophy will require a cultured change in the defense community. It will also require the intelligent use of appropriate analysis techniques. This report describes the basic analytical tools used in TQM: Process flow charts, Ishikawa charts, Statistical process control, Histograms, Pareto diagrams, Scattergrams and the Shewhart cycle. For easier comprehension, a mythical scenario is used in which the tools are introduced to a willing, but untrained, manager (and to the reader) by a TQM specialist. GRA

N91-27188# Joint Publications Research Service, Arlington, VA.
US EXPERIENCE CITED TO URGE CHANGE IN SPACE PROGRAM MANAGEMENT

VLADIMIR TEREKHOV *In* its JPRS Report: Science and Technology. USSR: Space p 59-62 7 Feb. 1991 Transl. into ENGLISH from Sovetskaya Rossiya (Moscow, USSR), 22 Aug. 1990 p 2

Avail: NTIS HC/MF A05

The following subject areas are covered: comparison of Soviet and American space programs; NASA programs; cost estimates; space communication systems; budgeting of scientific programs; space program and national defense; and space policies in the U.S.S.R. Author

N91-28024# Institute for Defense Analyses, Alexandria, VA.
CONCURRENT ENGINEERING TEAMS. VOLUME 1: MAIN TEXT

KAREN J. RICHTER and DAVID A. DIEROLF Nov. 1990 56 p
(Contract MDA903-89-C-0003)
(AD-A236093; IDA-P-2516-VOL-1; IDA/HQ-90-36607; AD-E501383) Avail: NTIS HC/MF A04 CSCL 05/1

Specific concurrent engineering practices vary among organizations. There are, however, various management practices

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that appear to work well for most organizations. This paper presents the reader with specific, useful examples from several defense contractors illustrating how multifunctional concurrent engineering teams are being organized and managed and how concurrent engineering team meetings are conducted and supported. The types of computer support that could be used to enhance the efficiency and effectiveness of concurrent engineering team meetings are identified. The general findings are that there exists a direct relationship between total quality management (TQM) and concurrent engineering, and that many applications of computer-aided group problem solving are possible and practical today for the concurrent engineering team meetings. Areas identified for additional research are the documentation of the decision process and rationale during the product and process definition, the capturing of lessons learned during the implementation of concurrent engineering, and the performance evaluation and training of team members. GRA

N91-28026*# National Aeronautics and Space Administration, Washington, DC.

ISSUES IN NASA PROGRAM AND PROJECT MANAGEMENT

FRANCIS T. HOBAN, ed. 1991 62 p
(NASA-SP-6101(04); NAS 1.21:6101(04)) Avail: NTIS HC/MF A04 CSDL 05/1

This volume is the third in an ongoing series on aerospace project management at NASA. Articles in this volume cover the attitude of the program manager, program control and performance measurement, risk management, cost plus award fee contracting, lessons learned from the development of the Far Infrared Absolute Spectrometer (FIRAS), small projects management, and age distribution of NASA scientists and engineers. A section on resources for NASA managers rounds out the publication.

Author

N91-28039# Defense Logistics Agency, Alexandria, VA.
INFORMATION RESOURCES MANAGEMENT ENVIRONMENT VISION AND PRESCRIPTION, VERSION 1.1

ROBERT J. KNEZ Apr. 1991 83 p
(AD-A236846) Avail: NTIS HC/MF A05 CSDL 12/7

This paper outlines a vision for DLA's IRM environment in the mid-1990s and beyond. It prescribes a re-engineered data, process, technology, and organizational environment intended to facilitate sharing of data, manufacturing of information systems components and the assembly of applications to a customer's order. Its tenets are achieved through a single image corporate data model of subject data bases, business process foundation modules, design to the State-of-the-Contract technology policy, extensive use of information engineering and repository methodology, central development and maintenance of application components, distributed application assembly, open systems, and cooperative processing. It recognizes the need to make several paradigm shifts and prescribes alternative migration strategies including fresh start and cross model resolution evolutionary approaches. GRA

N91-28263*# National Aeronautics and Space Administration, Washington, DC.

LESSONS LEARNED AND THEIR APPLICATION TO PROGRAM DEVELOPMENT AND CULTURAL ISSUES

GILBERT L. ROTH *In its* Space Transportation Propulsion Technology Symposium. Volume 3: Panel Session Summaries and Presentations p 1261-1276 May 1991
Avail: NTIS HC/MF A99 CSDL 22/2

The knowledge used today is contained in an untold number of technical and managerial handbooks. This knowledge is derived from the known strengths and weaknesses experienced during the execution of programs and projects that are being used today. The purpose is to stir up thought, not on specific experiences, but on implementation of lessons learned from these experiences. B.G.

N91-28268*# National Aeronautics and Space Administration, Washington, DC.

MAJOR SYSTEM ACQUISITIONS PROCESS (A-109)

C. SARIC *In its* Space Transportation Propulsion Technology Symposium. Volume 3: Panel Session Summaries and Presentations p 1313-1323 May 1991
Avail: NTIS HC/MF A99 CSDL 05/1

The Major System examined is a combination of elements (hardware, software, facilities, and services) that function together to produce capabilities required to fulfill a mission need. The system acquisition process is a sequence of activities beginning with documentation of mission need and ending with introduction of major system into operational use or otherwise successful achievement of program objectives. It is concluded that the A-109 process makes sense and provides a systematic, integrated management approach along with appropriate management level involvement and innovative and 'best ideas' from private sector in satisfying mission needs. Author

N91-29067# Virginia Polytechnic Inst. and State Univ., Blacksburg.

EXPERIENCE IN DESIGNING AND USING A FLAT STRUCTURE IN A MULTI-PROJECT RESEARCH ORGANIZATION

H. A. KURSTEDT, JR., E. J. GARDNER, and T. B. HINDMAN, JR. 1990 5 p

(Contract DE-FG02-88DP-48058)
(DE91-012427; DOE/DP-48058/T6) Avail: NTIS HC/MF A01

In early 1986, the organization of the Management Systems Laboratories (MSL) was changed from a standard matrix to a flat organization. The flat organization contributed more negative influences on the organization and its goals than positive ones. One year later, the flat organization was changed to a standard hierarchy and most negative influences were overcome. Before, during, and after the flat organization, MSL saw significant growth in funding and in its resource needs. This paper is an account of an experience with a type of flat organization, why the change to that organization, what worked and what didn't, why a change away from that organization, what was learned from the experience, and what would be recommended for research organizations considering flat organizations. DOE

N91-29069# Virginia Polytechnic Inst. and State Univ., Blacksburg. Management Systems Labs.

STRUCTURED MEETING TECHNIQUES IDENTIFY EMERGENCY MANAGEMENT ISSUES PRACTITIONERS REALLY WANT TO SEE ADDRESSED

G. E. RUBERG and J. F. KEELING, III Feb. 1991 10 p
(Contract DE-FG02-88DP-48058; DE-FC06-87CH-10343)
(DE91-012414; DOE/DP-48058/T9) Avail: NTIS HC/MF A02

Emergency Management (EM) researchers need a proactive and systematic approach for obtaining research topics practitioners really want to see addressed. Because of the inter-disciplinary nature of EM, traditional research hasn't provided practitioners with the information and management tools they can readily use. Furthermore, because historically EM practitioners haven't been academically oriented, they haven't been inclined to make use of the research provided. It is felt that this is changing as evidenced by such activities as an increased emphasis on professional standards and training: one example is the National Coordinating Council on Emergency Management's project to develop professional standards for emergency managers. The method adds another link to the connection between research and practice to better meet the needs of emergency managers. Three structured meeting techniques are introduced that can be used to determine EM issues practitioners really want to see addressed. The benefits of using these techniques are listed and recommendations are provided for research based on three applications of the techniques. DOE

N91-29843# Army Strategic Defense Command, Huntsville, AL.
MANAGEMENT OF VARIATION AND TQM Final Report

WILLIAM E. HUGHES, JR. Jul. 1991 35 p
(AD-A238399) Avail: NTIS HC/MF A03 CSDL 12/3

Variation has been studied by statisticians and scientists for decades. Although variation is not a new concept, what is new is

the awareness that variation affects everyday activities in the workplace. Modern man is plagued with variation problems ranging from raw materials to finished products and services. No matter how precise our methods of producing products and providing services becomes, there will always be some degree of variation. Today's thrust toward the Total Quality Management (TQM) concept will include the understanding of variation. In fact, the concept of variation may be analyzed in each of Deming's 14 points. Future variation issues will include the understanding and management of people. GRA

N91-30979# Government-Univ.-Industry Research Roundtable, Washington, DC.

SUMMARY OF INTERIM REPORTS SUBMITTED BY GRANTEE ORGANIZATIONS PARTICIPATING IN THE FEDERAL DEMONSTRATION PROJECT

A. SCANLEY and W. SELLERS 1 Oct. 1990 22 p
(Contract DE-FG05-89ER-75498)
(DE91-013938; DOE/ER-75498/7) Avail: NTIS HC/MF A03

The Federal Demonstration Project (FDP) is a cooperative effort among 28 academic institutions, a private research institute, and 11 federal agencies to increase research productivity by eliminating unnecessary administrative procedures and by streamlining and standardizing needed controls. The Government-University-Industry Research Roundtable serves as a logistical center, a neutral convener for discussion of issues affecting the FDP, and as a catalyst for the implementation of procedures successfully demonstrated the FDP. The FDP is an outgrowth of the earlier Florida Demonstration Project. The most successful of the procedures demonstrated in Florida (carry-forward, rebudgeting, pre-award costs, and no-cost extension) have been approved for use nationwide by all research sponsoring federal agencies. These "expanded authorities" are also the core of the terms and conditions that apply to grants issued under the current FDP. As new demonstrations are developed under the FDP, they are added to the core terms and conditions. Four demonstrations have been implemented under the Federal Demonstration Project: Non-Competing Renewals in July 1989; Equipment Screening in April 1990; Documentation and Allocation Standard in July 1990; and Rights-in-Data in July 1990. A fifth demonstration, dealing with representations and certifications, was announced in July 1989 but withdrawn that September. Others are in the development stage. As required by the letter of agreement that formalizes participation in the FDP, each of the participating grantee organizations has submitted in interim report that describes the steps taken to implement the FDP and the impact of the FDP on the organization. DOE

N91-30984# Naval Sea Systems Command, Washington, DC.
PROCEEDINGS OF THE 28TH ANNUAL TECHNICAL SYMPOSIUM ON ACHIEVING TECHNICAL AND MANAGEMENT EXCELLENCE

J. JOHNSTON, D. OCOLMAN, and C. MATHAI 1991 257 p
Symposium held in Arlington, VA, 11 Apr. 1991
(PB91-189134) Avail: NTIS HC/MF A12 CSCL 05/1

The following topics are covered: (1) an affordability focus on the Shipbuilding and Conversion, Navy (SCN) funds; (2) systems engineering in ship design; (3) combat systems engineering process; (4) the effects of confined water operation on ship performance; (5) video enhanced Ship Energy Conservation Assist Team (SECAT) Program; (6) quality ship service power with an integrated diesel electric propulsion plant; (7) electromagnetic interference; (8) damage control as the last line of defense and guardian of sustained mission capability; (9) probabilistic ship structural design; (10) naval shipyard corporate operations strategy and plan; (11) improving the naval ship design, acquisition, and construction process; (12) sea systems modification and modernization by modularity (SEAMOD); (13) hazardous material and hazardous waste management within the Navy; (14) computer-aided acquisition and logistics management system; (15) why engineers don't understand logistics; (16) operational use of low level white lighting; and (17) the FFG61 prototype digital technical library. GRA

N91-31008# Helsinki Univ. of Technology, Espoo (Finland). Faculty of Information Technology.

FORM-BASED APPROACH TO DISTRIBUTED COOPERATIVE WORK Ph.D. Thesis

HEIKKI HAEMMAEINEN Helsinki, Finland Finnish Academy of Technology 1991 52 p Sponsored by Finnish Technology Development Center; PTT Finland; and KONE Corp.
(ACTA-POLYTEC-SCAND-MA-58; ISBN-951-666-323-0; ISSN-0355-2713; ETN-91-99538) Avail: NTIS HC/MF A04

An object oriented form based multiagent model to facilitate the rapid construction of integrated systems for distributed cooperative work is developed. The model consists of autonomous asynchronous event driven user agents managing private formbases and interacting with each other through form interchange. A high degree of abstraction is achieved by unifying the visual appearance, storage, processing, and communication behavior of forms through a generalized form metaclass. As a central contribution, the integration of form classes among cooperating agents is solved locally by means of a special inheritance scheme which allows flexible management of both the private and shared form classes. The conceptual model is implemented as a generic user agent called the Programmable Agents for Group Interaction System (PAGES). The PAGES is used to construct a system called a change management in distributed environment (CHAMADE) which supports the integrated coordination of the formal and informal collaboration on order amendments between salesmen, designers, and engineers along the supply chain in distributed manufacture of one of a kind elevators. The CHAMADE shows that the underlying object-oriented form abstraction facilitates rapid construction of applications which are impossible, or at least impractical, to implement with more conventional tools. In addition, it shows that the throughput time of group task, e.g., change negotiations, can be significantly reduced when using these applications. The expected gross impact of faster group tasks is a shorter overall throughput time of elevators along the supply chain. ESA

N91-33002# Sandia National Labs., Albuquerque, NM.

TEACHING ENGINEERS TO BE TECHNICAL LEADERS

T. CANNON 1991 6 p Presented at the IEEE USA's Biennial Careers Conference, Denver, CO, 10 Oct. 1991
(Contract DE-AC04-76DP-00789)
(DE91-016117; SAND-91-1719C; CONF-9110171-2) Avail: NTIS HC/MF A02

Engineers invest several years becoming skilled in the many disciplines necessary to effectively carry out analysis, design and development. This typically includes math, physics, computer science, and special study in their core area of expertise. However, once promoted into management, engineers use less and less of these hard-earned technical skills and find themselves operating in nontechnical arenas in which they have little or no formal training. (The formal training that they do get is often through company-sponsored courses, lacking both the rigor and cohesiveness that they have grown accustomed to in their engineering curriculum.) Often, what they are exposed to are continually varying management doctrines that resemble the flavor of the month, each laying claim to the true secrets of motivation, productivity, and organizational competitiveness. Under such circumstances, it is difficult for the neophyte manager to sort out fact from fancy, and help from hype. It therefore would be helpful to put such theories in perspective and present them in a form most easily digested by technical managers, i.e., from an analytical point of view. This paper attempts to do just that. There are many factors that influence a manager's career progression. One of the most rational factors is how the manager's actions affect the productivity of his or her group. This paper focuses on principles and techniques that a manager can, and should, employ to improve group productivity and enhance his or her opportunities for further advancement. DOE

N91-33007# Defense Logistics Agency, Alexandria, VA.
**DEFENSE LOGISTIC AGENCY (DLA) LONG-RANGE
 INFORMATION RESOURCES MANAGEMENT (IRM) PLAN, FY
 1991 - FY 1997. VOLUME 1: AGENCY-WIDE PLAN IRM
 SUMMARY INFORMATION: AGENCY**

1991 139 p
 (PB91-204529) Avail: NTIS HC/MF A07; also available in set of 4 reports as HC/MF E99 CSCL 05/2

The results of executing the newly created DLA IRM Plan processes are presented. The scope of the DLA Long-range IRM plan FY 1991 to 1997 encompasses the management of information itself and its related resources, such as personnel, equipment, funds, and technology. Author

N91-33008# Defense Logistics Agency, Alexandria, VA.
**DEFENSE LOGISTICS AGENCY (DLA) LONG-RANGE
 INFORMATION RESOURCES MANAGEMENT (IRM) PLAN, FY
 1991 - FY 1997. VOLUME 2: INDIVIDUAL ORGANIZATIONAL
 IRM PLANS: ORGANIZATIONS**

1991 266 p
 (PB91-204537) Avail: NTIS HC/MF A12; also available in set of 4 reports as HC/MF E99 CSCL 05/2

The DLA IRM plan for FY 1991 to 1997 was prepared to provide the beginnings of an IRM framework and strategic direction needed in the development of future requirements. The goal of the planning process is to ensure that DLA improves customer support and program management, increases productivity and quality, reduces inefficiencies, and uses limited resources more effectively. Author

N91-33009# Defense Logistics Agency, Alexandria, VA.
**DEFENSE LOGISTICS AGENCY (DLA) LONG-RANGE
 INFORMATION RESOURCES MANAGEMENT (IRM) PLAN, FY
 1991 - FY 1997. VOLUME 3: INFORMATION
 SYSTEMS/PROJECTS/PROGRAMS/ACQUISITIONS:
 CATALOGUE**

1991 235 p
 (PB91-204545) Avail: NTIS HC/MF A11; also available in set of 4 reports as HC/MF E99 CSCL 05/2

The DLA IRM plan for FY 1991 to 1997 was prepared to provide the beginnings of an IRM framework and strategic direction needed in the development of future requirements. The goal of the planning process is to ensure that DLA improves customer support and program management, increases productivity and quality, reduces inefficiencies, and uses limited resources more effectively. The necessary information systems, project plans, and acquisitions catalog is presented. Author

N91-33010# Defense Logistics Agency, Alexandria, VA.
**DEFENSE LOGISTICS AGENCY (DLA) LONG-RANGE
 INFORMATION RESOURCES MANAGEMENT (IRM) PLAN, FY
 1991 - FY 1997. VOLUME 4: REFERENCE INFORMATION:
 REFERENCE**

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Volume 4 of the IRM plan presents reference information and supplements volumes 1 to 3. Data included are definitions, regulations, defense management review decisions, source information, table of contents, IRM requirements' line item numbers index, and the index. Author

INDUSTRIAL MANAGEMENT AND MANUFACTURING

Includes Industrial Management, Engineering Management, Design Engineering, Production Management, Construction, Aerospace/Aircraft Industries, Manufacturing.

A91-10119#
ENGINEERS AS MANAGERS

TROY V. CAVER (Systems Management and Development Corp., Newington, VA) AIAA, Space Programs and Technologies Conference, Huntsville, AL, Sept. 25-27, 1990. 9 p.
 (AIAA PAPER 90-3734) Copyright

The process of training technical experts and engineers for management positions is addressed. It is emphasized that there is a growing need for managers at every level of decision making to understand the impact of technology in achieving a profit. The issues of profit calculation, asset management, marketing, cost estimating, pricing and cost control, and master scheduling and systems management are introduced. The topics of technology insertion, risk control, and personnel management are also discussed with the aim of pointing out how these skills fit into managerial duties, why they are important to the organization, and how the specific talents of engineers may be effectively applied to problems and processes associated with these managerial responsibilities. L.K.S.

A91-13777#
DEVELOPMENT OF JAPANESE EXPERIMENT MODULE (JEM)
 KAZUO MATSUMOTO, KUNIYUKI SHIRAKI, YASUSHI HORIKAWA (NASDA, Tokyo, Japan), and NOBUYUKI TOMITA (Mitsubishi Heavy Industries, Ltd., Nagoya, Japan) IAF, International Astronautical Congress, 41st, Dresden, Federal Republic of Germany, Oct. 6-12, 1990. 8 p.
 (IAF PAPER 90-068) Copyright

The most recent JEM configuration, stowage allocation summary and launch configuration are presented. JEM system design activities and contractors are listed, and it is noted that system design began in early 1990. JEM major development items are listed and include power distribution unit, control processor, control system network, airlock, RMS control system elements, control system atmosphere, meteoroid/debris protection system, and payload attach mechanism. JEM project master and basic schedules are also presented. A number of major technological issues are briefly discussed including resource allocation, remote manipulator system operational feasibility test, air distribution and ventilation test, and an equipment exchange unit R&D test. L.K.S.

A91-14749#
**SELECTION OF PARAMETERS FOR STATISTICAL
 EXPERIMENTAL DESIGN**

KARL P. WANG (Copeland Corp., Sidney, OH) AIAA, Total Quality Management Symposium, 2nd, Baltimore, MD, Nov. 14-16, 1990. 9 p.
 (AIAA PAPER 90-4046) Copyright

A two-step method to optimize the utilization of the orthogonal array experiment is presented. The first step is to collect as many relevant parameters as possible, ignore the interaction effects, and apply the methodology of changing only one factor with respect to some baseline experiment. The second step is to utilize the orthogonal array experiment including the interaction effect, the confirmation test, and the ANOVA table. If the result is repeatable and the test confirms this, then the orthogonal array experiments are successful. It is shown that this two-step method has the ability to reduce the time and costs of the development of new products for many practical engineering design problems. R.E.P.

A91-17421

STRIVING TO ACHIEVE C-17 GOALS

WILLIAM B. SCOTT Aviation Week and Space Technology (ISSN 0005-2175), vol. 133, Dec. 3, 1990, p. 46-49.

Copyright

The C-17 program is beginning to realize payoff from new manufacturing techniques. After accumulating several months of actual cost and man-hour data, it is seen that manufacturing improvements between the first test and production aircraft have reduced workmanship discrepancies by 44 percent, manhours by 22 percent and the number of unfinished items by 36 percent. Automated precision drilling, countersinking and fastener installation are anticipated to cut labor costs significantly and reduce the amount of rework. A multilevel process is used to integrate all C-17 avionics and flight control software and hardware. A flight hardware simulator is configured with actual flight software and hardware that emulates the complete system to be installed on a test aircraft. The C-17 will utilize propulsive or powered lift to shorten runway length required for takeoffs and landings. This powered-lift effect is produced by engine exhaust gases blowing over large flaps that are almost the size of a DC-9 wing. R.E.P.

A91-19891

MULTIATTRIBUTE UTILITY ANALYSIS IN DESIGN MANAGEMENT

DEBORAH L. THURSTON (Illinois, University, Urbana) IEEE Transactions on Engineering Management (ISSN 0018-9391), vol. 37, Nov. 1990, p. 296-301. refs

(Contract NSF DMC-88-09829; NSF DDM-89-57420)

Copyright

A methodology is presented by which engineering design managers can consider technical aspects of a design concurrently with economic aspects of the manufacturing system in selecting among alternatives and directing the design effort. The concept of design flexibility as an attribute which captures both technical and economic considerations in one quantifiable performance measure is developed and incorporated into deterministic multiattribute utility analysis. The alternative of greatest overall utility to the decision-maker is identified, and sensitivity analysis is performed to identify and quantify desirable trade-offs between attributes. The problem of materials selection and design in the automotive industry is presented as a case study. The methodology was applied to five automotive companies in the United States and Europe, and results from two companies are used to illustrate the insights gained. I.E.

A91-21219* Stanford Univ., CA.

DYNAMIC SYSTEMS-ENGINEERING PROCESS - THE APPLICATION OF CONCURRENT ENGINEERING

MICHAEL J. WISKERCHEN (Stanford University, CA) and R. BRUCE PITTMAN (DYSE Corp., San Jose, CA) Engineering Management Journal. (ISSN 1042-9247), vol. 1, June 1989, p. 27-34.

(Contract NCC10-0001)

Copyright

A system engineering methodology is described which enables users, particularly NASA and DOD, to accommodate changing needs; incorporate emerging technologies; identify, quantify, and manage system risks; manage evolving functional requirements; track the changing environment; and reduce system life-cycle costs. The approach is a concurrent, dynamic one which starts by constructing a performance model defining the required system functions and the interrelationships. A detailed probabilistic risk assessment of the system elements and their interrelationships is performed, and quantitative analysis of the reliability and maintainability of an engineering system allows its different technical and process failure modes to be identified and their probabilities to be computed. Decision makers can choose technical solutions that maximize an objective function and minimize the probability of failure under resource constraints. C.D.

A91-26836

NEW DESIGN STRATEGIES AND TECHNOLOGIES FOR OPERATOR-MACHINE INTERFACE FOR SPACE PLATFORM DESIGN, OPERATIONS, AND PLANNING

J. L. NEVINS, D. E. WHITNEY, and R. W. METZINGER (Charles Stark Draper Laboratory, Inc., Cambridge, MA) IN: Guidance and Control 1990; Proceedings of the Annual Rocky Mountain Guidance and Control Conference, Keystone, CO, Feb. 3-7, 1990. San Diego, CA, Univelt, Inc., 1990, p. 625-633. refs (AAS PAPER 90-006) Copyright

It is proposed that considerable gains in efficiency can be achieved in the areas of space platform design and construction as well as in the planning and execution of space operations by the application of recent advances in manufacturing technology. The advances which are considered applicable include the concurrent design or engineering strategy and new sensor capabilities which will perform wrist force sensing and target location determination. It is pointed out that these devices can augment the capabilities of conventional manipulator devices.

L.M.

A91-26847

SAYING IS ONE THING, DOING IS ANOTHER

DOUGLAS O. PATTERSON (U.S. Navy, Washington, DC) IES, Journal (ISSN 1052-2883), vol. 34, Jan.-Feb. 1991, p. 17-20.

Copyright

This paper briefly reviews the origins of the DOD templates and their relationship to the industrial processes associated with material acquisition. The principal features of the TQM initiative are then summarized, with emphasis on the DOD and Navy interpretations currently being implemented. Focusing on the Navy material acquisition function, the templates and TQM are shown to represent an integrated approach which offers maximum benefit to both the government and industry. Some 'traps' in the DOD implementation of TQM are identified, along with some thoughts on how to escape. Author

A91-26937

PROJECT RISK ASSESSMENT USING THE ANALYTIC HIERARCHY PROCESS

MOHAMMAD A. MUSTAFA and JAMAL F. AL-BAHAR (Kuwait Institute for Scientific Research, Safat) IEEE Transactions on Engineering Management (ISSN 0018-9391), vol. 38, Feb. 1991, p. 46-52. refs

Copyright

Construction projects often fail to achieve their time, budget, and quality goals. This is frequently due to the failure of the contractor to analyze and assess all risk factors. The analytic hierarchy process (AHP) is an approach that can be used to analyze and assess project risks during the bidding stage of a construction project and to overcome the limitations of the approaches currently used by contractors. The AHP provides a flexible, easily understood way to assist the decision-maker in formulating a problem in a logical and rational manner. A review of the AHP and a description of its application in the assessment of the riskiness of constructing the Jamuna multipurpose bridge in Bangladesh are included. I.E.

A91-27433#

UTILIZATION OF SMALL COMMERCIAL GRADE NICKEL CADMIUM (NICD) CELLS IN LOW EARTH ORBIT (LEO) APPLICATIONS

T. DARONE, P. STIFFLER, R. BONOMETTI (DARPA, Arlington, VA), B. CARTER (Aerospace Corp., El Segundo, CA), and E. ENG (Defense Systems, Inc., McLean, VA) IN: Annual AIAA/Utah State University Conference on Small Satellites, 4th, Logan, UT, Aug. 27-30, 1990, Proceedings. Vol. 2. Logan, UT, Utah State University, 1990, 12 p.

A review is presented of the procedure that was developed to screen, select, and match commercial-grade nickel-cadmium cells for application as flight batteries aboard DARPA's initial LightSats. The batteries constructed for the first mission were made up of 15 cells wired in series, having redundant stacks in each of the two satellites. Screening and matching techniques described are

specifically tailored for mission and environmental conditions, including an orbit altitude of 400 nm, an orbit inclination of 90 deg, temperature limits of -10 to +40 C, and a design maximum depth of discharge of 10 percent. An acceptance test plan for screening and matching cells is also presented. It is shown that the use of commercial-grade cells may save eight to ten months in a program where emphasis is placed on rapid design and development. R.E.P.

A91-35448 THE ATLAS E/F LAUNCH VEHICLE - AN UNSUNG WORKHORSE

J. W. POWELL (Space Information Canada, Calgary) and G. R. RICHARDS (British Interplanetary Society, Journal (ISSN 0007-084X), vol. 44, May 1991, p. 229-240. refs
Copyright

Over the 22 years ending in April 1990, the USAF and NASA used the 'E/F' version of the venerable Atlas ICBM for 39 launches, using 11 different upper-stage combinations. Beginning in 1983, a number of the Atlas E/F payloads were assigned to the Atlas H launch vehicle derived from the SLV-3D version of the NASA Atlas-Centaur. A complete Atlas E/F and H chronology is presented, in conjunction with a historical account of some of the most significant satellite payloads lofted by these launch vehicles. O.C.

A91-35450 EUROPEAN COMMISSION'S PROPOSALS ON CIVIL AVIATION PERSONNEL LICENSING; PROCEEDINGS OF THE CONFERENCE, LONDON, ENGLAND, OCT. 24, 1990

London, Royal Aeronautical Society, 1990, 53 p. No individual items are abstracted in this volume.
Copyright

Topics presented include the EEC principles for mutual recognition of licenses in civil aviation, the U.K. role of the national aviation authorities, and personnel licensing for engineers. Also contributed are the viewpoint of engineer employees, general considerations of air traffic controllers, and using harmonization to standardize European ATC licenses. R.E.P.

A91-38954*# National Aeronautics and Space Administration, Washington, DC.

USER ACCOMMODATIONS ON SPACE STATION FREEDOM
THOMAS L. MOSER (NASA, Washington, DC) IN: Space commercialization: Platforms and processing; Symposium on Space Commercialization: Roles of Developing Countries, Nashville, TN, Mar. 5-10, 1989, Technical Papers. Washington, DC, American Institute of Aeronautics and Astronautics, Inc., 1990, p. 36-60. refs
Copyright

The historical background of the SSF is overviewed, and current developments in methodology used to accommodate specific user requirements and physically integrate payloads on the station are discussed. Particular attention is given to the science and technology opportunities provided to commercial and government-sponsored users. Evolution of the SSF design and utilization impacts on design philosophy are also considered. O.G.

A91-38956# SPACE STATION APPLICATION OF LESSONS LEARNED FROM SPACE SHUTTLE INTEGRATED OPERATIONAL PROTOTYPES

MICHAEL J. WISKERCHEN (DYSE Corp., Stanford, CA) IN: Space commercialization: Platforms and processing; Symposium on Space Commercialization: Roles of Developing Countries, Nashville, TN, Mar. 5-10, 1989, Technical Papers. Washington, DC, American Institute of Aeronautics and Astronautics, Inc., 1990, p. 69-83.
Copyright

The system engineering methodology based on the concurrent engineering approach for the development of a long-term, inexpensive and efficient space operation capability is described.

It is recommended to maintain an iterative engineering process throughout the full life cycle of a project for incorporating dynamically changing requirements and technology. The process is driven by information obtained from risk assessment analysis and rapid prototyping test beds that are carried out by technology-user-design engineering teams. O.G.

A91-40368 JAPAN - A MAJOR FORCE IN ADVANCED CERAMICS

American Ceramic Society Bulletin (ISSN 0002-7812), vol. 70, June 1991, p. 948-959.
Copyright

A comprehensive evaluation is made of the Japanese advanced ceramics industry, based on patent-grant trend indicators, the commercialization-related work of the Japan Fine Ceramics Center (JFCC, operating in Nagoya since 1987), the JFCC's Fine Ceramics Fair (in which 250 companies participated in March, 1991), and the ease with which U.S. companies can penetrate the Japanese advanced ceramics market. Attention is given to such foci of intensive Japanese ceramics research as automated testing, ceramic-component substitution for conventional materials, sol-gel and molecular powder processing, fine-particle spray pyrolysis, hydrothermal processing, and CVD and colloidal processing. University research practices on behalf of industries are discussed. O.C.

A91-43347# DYNAMIC DEVELOPMENT OF SPACE BUSINESS - A STUDY OF GERMAN SPACE INDUSTRY

R.-H. KLEB (Kienbaum Unternehmensberatung GmbH, Federal Republic of Germany) ESA Bulletin (ISSN 0376-4265), no. 66, May 1991, p. 101-103.
Copyright

A review is presented of an empirical study of the German space industry that is based on data and databases collected from government and industry sources. It is seen that in addition to the generation of more private demand for space systems, the increase in the level of technological expertise within industry can itself contribute to additional market development. Attention is given to the total public-authority expenditure on space activities between 1976 and 1985 and the allocation of funds to space industry in 1985. R.E.P.

A91-48672 COMPOSITE SUPPORTABILITY

E. A. WESTERMAN (Boeing Military Airplanes, Seattle, WA) Society of Manufacturing Engineers, Conference on Composites in Manufacturing, 10th, Anaheim, CA, Jan. 7-10, 1991, 9 p. (SME PAPER EM91-114) Copyright

The roles of composite materials in aircraft support and associated problems are discussed. The skills and training required of personnel who handle composites are summarized, and current practices in the repair of composites are examined. Improvements that need to be made in these practices are addressed. C.D.

A91-48768 SYNCHRONIZED MANUFACTURE OF COMPOSITES KNOWLEDGE STUDY (SMACKS)

B. STRICKLAND (Marine Training Association, England) and M. OLIVER (Composites Manufacturing (ISSN 0956-7143), vol. 1, June 1990, p. 103-108. refs
Copyright

The need for a competitive manufacturing knowledge base for the composites industry, encompasses a change from a 'functionally' organized factory to a product-based organization, and has led to major reductions in inventories, manufacturing costs and cycle times. The net effect was that products became more price- and delivery-competitive. It is believed that composite manufacturers have an equal need to improve their competitive edge, particularly as the demand for composite products grows and more manufacturers enter the marketplace. 'SMACKS' has begun to establish these needs and market trends, with a view to

establishing the advantages offered to composite manufacturers by synchronized manufacturing methods. Author

A91-52830

AIRCRAFT DESIGN - WHERE DOES IT STAND?

JAN ROSKAM (Kansas, University, Lawrence) Aerospace America (ISSN 0740-722X), vol. 29, Sept. 1991, p. 26-29. Copyright

A detailed description of the different phases of aircraft design is presented; questions on unresolved issues with regard to design methodology are posed; and an overview on some of the major design mistakes made during the past ten years is given. From the comparison between design and other professions it is concluded that there is neither an archival aircraft design journal nor a source of academic funding for design research activities at universities. It is pointed out that the great majority of conceptual designers do not have doctorates and have little motivation to pursue an academic career. The importance of designers understanding future customer needs is stressed, since design decisions are driven by those needs and new technological developments. The validation of these developments before their incorporation into production hardware is a major factor in the design decision-making process. V.I.

A91-54012*# Purdue Univ., West Lafayette, IN. DESIGN OF A TURBOFAN POWERED REGIONAL TRANSPORT AIRCRAFT

TERRENCE A. WEISSHAAR and CARL L. ALLEN (Purdue University, West Lafayette, IN) AIAA, AHS, and ASEE, Aircraft Design Systems and Operations Meeting, Baltimore, MD, Sept. 23-25, 1991. 11 p. Research supported by NASA and Universities Space Research Association. refs (AIAA PAPER 91-3080) Copyright

The majority of the market for small commercial transport aircraft is dominated by high-efficiency, propeller-driven aircraft of non-U.S. manufacture. During the past year design teams responded to a Request For Proposal (RFP) for a regional transport aircraft. The RFP development identified promising world markets and their needs. Aircraft are designed with ranges of up to 1500 nautical miles and passenger loads between 50 and 90. During the design project, special emphasis was placed upon keeping acquisition cost and direct operating costs at a low level while providing passengers with superior comfort levels. This paper describes the background that led to this effort, and a brief description of some of the designs. Author

A91-54064#

EXPERIENCES OF AN INTEGRATED PRODUCT DEVELOPMENT TEAM AT MCAIR

D. G. DUTCHER (McDonnell Douglas Corp., Saint Louis, MO) AIAA, AHS, and ASEE, Aircraft Design Systems and Operations Meeting, Baltimore, MD, Sept. 23-25, 1991. 5 p. (AIAA PAPER 91-3149) Copyright

Experiences of an Integrated Product Definition Team at McDonnell Aircraft Company are described. How a collocated multidisciplinary team focused on a particular product can produce a quality part in less time, eliminating downstream cost due to scrap and rework is shown. Supported by a Total Quality Management environment and given the proper tools, the team was tasked with providing a qualified manufacturer with all the necessary information to make a first time quality product. This information, in the form of a 'Build-To-Package', contained collaborated data from each discipline provided by different computer based tools. Configuration control and release of the data package presented the greatest challenge. A future solution for control and release of heterogeneous data is discussed. Author

A91-54066#

TRANSITIONING TO A CONCURRENT ENGINEERING ENVIRONMENT

M. S. KNODLE (General Dynamics Corp., Space Systems Div.,

San Diego, CA) AIAA, AHS, and ASEE, Aircraft Design Systems and Operations Meeting, Baltimore, MD, Sept. 23-25, 1991. 10 p. (AIAA PAPER 91-3151) Copyright

This paper addresses the specific steps to integrate the product development process and the transition to a concurrent engineering environment at General Dynamics Space Systems Division. A survey of industry and government trends, corporate plans and division goals relating to concurrent engineering was conducted. An integrated product development process was developed and implemented on a pilot project. Performance metrics were taken to evaluate the effectiveness of these new processes. Substantial cost, schedule and quality benefits were achieved. Based on this success, twelve follow-on pathfinder concurrent engineering teams have since been implemented on three separate programs. A concurrent engineering training course has been developed. A management level implementation team has been formed to institutionalize concurrent engineering methods and ease the transition phase to an integrated concurrent engineering environment. Author

A91-54067#

COST-CONSCIOUS CONCURRENT ENGINEERING

PETER T. RICCI and JEFFREY L. HALE (McDonnell Douglas Space Systems Co., Huntington Beach, CA) AIAA, AHS, and ASEE, Aircraft Design Systems and Operations Meeting, Baltimore, MD, Sept. 23-25, 1991. 10 p. refs (AIAA PAPER 91-3152) Copyright

Concurrent engineering (CE) is described and examples of its implementation are presented to evaluate practical applications of CE. Management and quality requirements for CE are listed with considerations both internal and external to the engineering enterprise. A CE benchmarking matrix is presented for characteristics such as training, performance measurement, and budgets. The development of strategic and tactical plans is described, and attention is given to the implementation approach and other key issues. Also identified are the most important aspects of the CE process which include management commitment, formal training programs, multidisciplinary teamwork, integrated schedules, and supplier partnerships. CE is considered to be an effective managerial philosophy for improving productivity and quality. C.C.S.

A91-54068#

CONCURRENT ENGINEERING - ELECTRONIC PACKAGING METHODOLOGY YIELDS QUALITY IMPROVEMENTS

A. J. TOMARCHIO (IBM Corp., Federal Sector Div., Manassas, VA) AIAA, AHS, and ASEE, Aircraft Design Systems and Operations Meeting, Baltimore, MD, Sept. 23-25, 1991. 8 p. (AIAA PAPER 91-3153) Copyright

This paper presents a concurrent engineering methodology described as structured design. The design methodology is characterized by early interaction of all product responsible disciplines, comprehensive definitization of product requirements, in-process design and development validation check points, and a closed-loop quality measurement and corrective action process. The effective interaction of engineering, manufacturing, and other product supporting disciplines has significantly improved the quality of design and has reduced overall product development cycle time. This paper will discuss the application of the methodology for designing electronic structures that yielded an 85-percent reduction of design engineering changes. Author

A91-54069#

MEASURING IMPLEMENTATION PROGRESS IN CONCURRENT ENGINEERING

G. R. MOSARD (McDonnell Douglas Space Systems Co., Huntington Beach, CA) AIAA, AHS, and ASEE, Aircraft Design Systems and Operations Meeting, Baltimore, MD, Sept. 23-25, 1991. 6 p. (AIAA PAPER 91-3154) Copyright

An aerospace company is implementing concurrent engineering teams on all programs. This paper describes a system and tools to continuously measure implementation progress and the impact

of concurrent engineering. Two major measuring approaches were developed: (1) benchmarking matrices used by teams, programs, support divisions, and a concurrent engineering advisory team to measure the transition to a concurrent engineering environment, and (2) an array of effectiveness measures for each team and program in cycle time, quality, productivity, cost, and schedule. Many existing measures must be supplemented or modified in a new concurrent engineering team environment to account for changes such as cycle time increases in early product development phases. Author

A91-54070#

DEVELOPMENT AND IMPLEMENTATION OF A FORMAL TRAINING PROGRAM FOR CONCURRENT ENGINEERING IN AN AEROSPACE ENVIRONMENT

MICHAEL L. WALO, GIL R. MOSARD, and STEVEN E. MOSES (McDonnell Douglas Space Systems Co., Huntington Beach, CA) AIAA, AHS, and ASEE, Aircraft Design Systems and Operations Meeting, Baltimore, MD, Sept. 23-25, 1991. 7 p. (AIAA PAPER 91-3155) Copyright

In the highly competitive aerospace industry, innovative approaches to quality improvement such as Total Quality Management (TQM) and one of its key elements, concurrent engineering (CE), are critical for survival. An effective training and education program is essential for a smooth transition to a concurrent engineering environment. The methodology and approach to instructional design used at McDonnell Douglas Space Systems Company (MDSSC) led to a concurrent engineering training program that stimulates interest in using concurrent engineering principles and tools. Other aerospace companies can adapt this training program to fit their specific needs. Author

A91-54397

SOME EXPERIENCES OF ADVANCED MANUFACTURING CELLS AT BRITISH AEROSPACE WARTON UNIT

J. M. DUXBURY (British Aerospace /Military Aircraft/, Ltd., Preston, England) Institution of Mechanical Engineers, Proceedings, Part G - Journal of Aerospace Engineering (ISSN 0954-4100), vol. 205, no. G1, 1991, p. 59-63. Copyright

The problem of makespan reduction is examined with reference to the manufacturing experience of British Aerospace Warton Unit. In particular, three production facilities are described which use three different approaches to achieve significant makespan reductions: automation between processes, organizational change, and 'automation of the shell' where conventional techniques are complemented by automated logistics. V.L.

A91-54845

THE US AND JAPANESE SPACE PROGRAMMES

DANIEL E. HASTINGS (MIT, Cambridge, MA) and DAMON R. WELLS Space Policy (ISSN 0265-9646), vol. 7, Aug. 1991, p. 233-256. refs Copyright

This reports begins with a brief historical overview of the U.S. and Japanese space programs before turning to an evaluation of the programs' philosophy and structure. The study then analyses relative trends in spending, size and efficiency, and compares the relative technical capabilities of the two programs in selected technology areas. Conclusions based on these analyses and data are provided, with particular emphasis given to an assessment of the objectives and potential of the Japanese program. Author

A91-56750

F-22 - MANAGING THE CHALLENGE

GRAHAM WARWICK Flight International (ISSN 0015-3710), vol. 140, Sept. 25, 1991, p. 32-34. Copyright

An overview is presented of the management concepts and evolutionary design and development improvements that are being implemented for production of the F-22 air-superiority fighter. The ATF competition judged the F-22 to have significant strengths including well-balanced design and the F119 engines's superior

margin for growth. Equally important were the F-22 team's program to mature the design and its plans to integrate development of airframe, engine, avionics, and support and training systems. Iterative design of the internal structure is an integral part of the development concept, which promises to eliminate design changes almost completely once fabrication begins, thus avoiding cost increases and schedule slips. Consideration is given to the integration of parts and production provided by 26 major subcontractors and 650 suppliers. R.E.P.

N91-10066# Rolls-Royce Ltd., Derby (England).

AERO ENGINE DESIGN FACTORS FOR A LOW FUEL PRICE SCENARIO

S. J. HARTROPP 15 May 1989 20 p Presented at Canadian Aeronautics and Space Institute, Ottawa, Ontario, 15-17 May 1989

(PNR-90681; ETN-90-97928) Copyright Avail: NTIS HC/MF A03

The driving parameters for aero engine design were reassessed to account for the stabilization of fuel price in the vicinity of 50 cents per gallon. A program embracing studies in the fields of operating cost analysis, reliability research and engine specific thrust effects established principles reflecting the importance of engine direct operating cost. The same factors influence the aircraft life cycle cost, and as legislative compliance, operator acceptance and passenger appeal. The effect of applying these principles to a new powerplant and the ongoing development of current powerplants is evaluated. ESA

N91-10073# Rolls-Royce Ltd., Coventry (England). Advanced Technology Center.

FABRICATION ASPECTS OF GLASS MATRIX COMPOSITES FOR GAS TURBINE APPLICATIONS

DAVID A. CLARKE Derby, England 12 Apr. 1990 12 p Presented at Warwick University Institute of Physics Conference on New Materials and Their Applications, Coventry, England, 10-12 Apr. 1990

(PNR-90752; ETN-90-97956) Copyright Avail: NTIS HC/MF A03

The background to the development of Glass Matrix Composites (GMC's) including the basic fabrication methods is presented. Some of the key problems involved in manufacturing production quantities of GMC gas turbine components are described. The need for highly repeatable, and hence largely automated, processing methods are highlighted. Glass/glass-ceramic matrix composites have mechanical properties suitable for use in gas turbines. The requirement for reliable production process is the repeatability to ensure high quality and the minimum post-fabrication inspection. ESA

N91-10228# Birmingham Univ. (England). Dept. of Engineering Production.

AN EVALUATION OF THE PRODUCTION PROCESSES AND METHODS ASSOCIATED WITH CARELLO CELL AT RISTS, TELFORD M.S. Thesis

EDWARD CONNOLLY Sep. 1989 96 p (ETN-90-97578) Avail: NTIS HC/MF A05

An evaluation of a small manufacturing unit, Carello Cell 1, a light leads assembly area at RISTS, Telford, is performed. The objectives are the followings: to examine the organization and tasking structure to evaluate the effectiveness of the manufacturing control procedures; to review the quality procedures and to comment their effectiveness; to assess machine utilization to identify potential problem areas; to investigate and to comment on machine serviceability, reliability, and maintainability; to identify factors to reduce machine down time and any other factors affecting production. Conclusions and recommendations are given, particularly concerning the needs of infrastructure of the factory, taking into account that it is in the process of major expansion. ESA

N91-12823# Oak Ridge National Lab., TN. Metals and Ceramics Div.

CERAMIC TECHNOLOGY FOR ADVANCED HEAT ENGINES
PROJECT Semiannual Progress Report, Apr. - Sep. 1989

Aug. 1990 518 p

(Contract DE-AC05-84OR-21400)

(DE91-001004; ORNL/TM-11489) Avail: NTIS HC/MF A22

The Ceramic Technology For Advanced Heat Engines Project was developed by the Department of Energy's Office of Transportation Systems (OTS) in Conservation and Renewable Energy. This project, part of the OTS's Advanced Materials Development Program, was developed to meet the ceramic technology requirements of the OTS's automotive technology programs. Significant accomplishments in fabricating ceramic components for the Department of Energy (DOE), National Aeronautics and Space Administration (NASA), and Department of Defense (DOD) advanced heat engine programs have provided evidence that the operation of ceramic parts in high-temperature engine environments is feasible. However, these programs have also demonstrated that additional research is needed in materials and processing development, design methodology, and data base and life prediction before industry will have a sufficient technology base from which to produce reliable cost-effective ceramic engine components commercially. An assessment of needs was completed, and a five year project plan was developed with extensive input from private industry. The objective of the project is to develop the industrial technology base required for reliable ceramics for application in advanced automotive heat engines. The project approach includes determining the mechanisms controlling reliability, improving processes for fabricating existing ceramics, developing new materials with increased reliability, and testing these materials in simulated engine environments to confirm reliability. Although this is a generic materials project, the focus is on structural ceramics for advanced gas turbine and diesel engines, ceramic bearings and attachments, and ceramic coatings for thermal barrier and wear applications in these engines. DOE

N91-12876# National Inst. of Standards and Technology, Gaithersburg, MD. Automated Production Technology Div.

NEED FOR RESEARCH IN ELECTRONICS ASSEMBLY TECHNOLOGY

H. T. BANDY Jul. 1990 32 p Sponsored by Harry Diamond Labs, Adelphi, MD
 (PB90-250101; NISTIR-4368) Avail: NTIS HC/MF A03 CSCL 09/3

The National Institute of Standards and Technology assisted the Harry Diamond Laboratories in an effort to develop plans for a new program of research in electronics assembly technology. The need for research was investigated in the domains of precision engineering, system integration, and process control. Rather than engineering design problems, the emphasis was on principles, techniques, and standards that could help eliminate obstacles to widespread adoption of state-of-the-art technology in assembly plants. Current popular assembly methods as well as emerging new trends were studied. Research projects are recommended in the following areas: (1) flexibility of equipment, (2) precision handling of components, (3) equipment interfaces, (4) equipment programmability, and (5) statistical process control. GRA

N91-13396# Office of Naval Research European Office, FPO New York, NY.

BRITE/EURAM: THIRD TECHNOLOGICAL DAYS FOR THE BASIC RESEARCH IN INDUSTRIAL TECHNOLOGIES IN EUROPE/EUROPEAN RESEARCH IN ADVANCED MATERIALS

J. F. BLACKBURN 29 Jun. 1990 13 p Conference held in Brussels, Belgium, 21-22 May 1990

(AD-A225522; ONREUR-90-5-C) Avail: NTIS HC/MF A03 CSCL 13/8

The Third Technological Days for the Basic Research in Industrial Technologies in Europe/European Research in Advanced Materials (BRITE/EURAM) Program was held in Brussels, Belgium, May 21-22, 1990. The BRITE portion of the program concentrates on integrating several enabling technologies and disciplines, such

as mechanics, optics, acoustics, and fluid dynamics in design and manufacturing. The EURAM deals with the development of new industrial materials and improvements of the materials life cycle of production, transformation, and recovery. GRA

N91-13446*# Massachusetts Inst. of Tech., Cambridge. Technology Lab. for Advanced Composites.

COMPOSITE FUSELAGE TECHNOLOGY Annual Report, 7 Apr. 1989 - 6 Apr. 1990

MICHAEL J. GRAVES and PAUL A. LAGACE Oct. 1990 25 p (Contract NAG1-991)

(NASA-CR-187658; NAS 1.26:187658; TELAC-90-19) Avail: NTIS HC/MF A03 CSCL 01/3

The overall objective is to identify and understand, via directed experimentation and analysis, the mechanisms which control the structural behavior of fuselages in their response to damage (resistance, tolerance, and arrest). A further objective is to develop straightforward design methodologies which can be employed by structural designers in preliminary design stages to make intelligent choices concerning the material, layup, and structural configuration so that a more efficient structure with structural integrity can be designed and built. Author

N91-13491*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, OH.

JANNAF LIQUID ROCKET COMBUSTION INSTABILITY PANEL RESEARCH RECOMMENDATIONS

MARK D. KLEM 1990 12 p Presented at the 27th JANNAF Combustion Meeting, Cheyenne, WY, 5-9 Nov. 1990

(NASA-TM-103653; E-5826; NAS 1.15:103653) Avail: NTIS HC/MF A03 CSCL 21/8

The Joint Army, Navy, NASA, Air Force (JANNAF) Liquid Rocket Combustion Instability Panel was formed in 1988, drawing its members from industry, academia, and government experts. The panel was chartered to address the needs of near-term engine development programs and to make recommendations whose implementation would provide not only sufficient data but also the analysis capabilities to design stable and efficient engines. The panel was also chartered to make long-term recommendations toward developing mechanistic analysis models that would not be limited by design geometry or operating regime. These models would accurately predict stability and thereby minimize the amount of subscale testing for anchoring. The panel has held workshops on acoustic absorbing devices, combustion instability mechanisms, instability test hardware, and combustion instability computational methods. At these workshops, research projects that would meet the panel's charter were suggested. The JANNAF Liquid Rocket Combustion Instability Panel's conclusions about the work that needs to be done and recommendations on how to approach it, based on evaluation of the suggested research projects, are presented. Author

N91-15217# Messerschmitt-Boelkow-Blohm/Entwicklungsring Nord, Bremen (Germany, F.R.).

ORGANISATIONAL ASPECTS OF ASSEMBLY, INTEGRATION AND VERIFICATION FOR COLUMBUS

A. GRAEBNER and H. NIMMO /n ESA, International Symposium on Environmental Testing for Space Programmes: Test Facilities and Methods p 35-40 Sep. 1990

Copyright Avail: NTIS HC/MF A23

The responsibility of the assembly integration and verification branch as an engineering control function of a project is explained on the example of Columbus. Special emphasis was put on the associated documentation aspects keeping in mind the fact the AIV (Assembly, Integration, Verification) responsibilities are spread over the complete life cycle of the program. The possibilities of a database support is especially considered. ESA

N91-18008# Beech Aircraft Corp., Wichita, KS. Technical Services Div.

AGING AIRCRAFT: ISSUES AND PARTIAL ANSWERS
Abstract Only

03 INDUSTRIAL MANAGEMENT AND MANUFACTURING

BILL SCHULTZ /in Wichita State Univ., Proceedings: Techfest 17 p 5 1991
Avail: NTIS HC/MF A03

The spectrum of factors affecting the airplane aging process are reviewed. Discussion emphasis is given to airframe strength, durability and life to show the complex nature of several aging influencing factors. The status of industry and regular activities and plans are also presented. Y.S.

N91-20978# Carnegie-Mellon Univ., Pittsburgh, PA. Robotics Inst.

EXPLOITING LOCAL FLEXIBILITY DURING EXECUTION OF PRE-COMPUTED SCHEDULES

STEPHEN F. SMITH, NAIPING KENG, and KARL KEMPF Jun. 1990 16 p Prepared in cooperation with Intel Corp., Santa Clara, CA
(AD-A230114; CMU-RI-TR-90-13) Avail: NTIS HC/MF A03
CSCL 13/8

This paper addresses the problem of realizing the benefits of pre-computed schedules in the face of partially unpredictable execution environment. We focus specifically on the problem of manufacturing production scheduling, where advance planning is crucial to overall factory performance but is, at the same time, confounded by the unpredictability of factory operations. We present a scheduling framework where decision-making responsibility is shared between a global scheduler, responsible for establishing and maintaining execution constraints in accordance with overall performance objectives, and a local dispatcher, responsible for containing execution within globally imposed constraints and notifying the scheduler when containment is no longer possible. We identify the sources of local executional flexibility that can be expected in a pre-computed schedule, and describe an execution-time scheduler (the dispatcher) capable of exploiting this flexibility. GRA

N91-23396# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands). Product Assurance and Safety Dept.

CHECKLIST FOR THICK-FILM HYBRID MICROCIRCUITS MANUFACTURER AND LINE SURVEY

Nov. 1990 56 p
(ESA-PSS-01-607-ISSUE-1; ISSN-0379-4059; ETN-91-99339)
Copyright Avail: NTIS HC/MF A04

A checklist intended for use in the capability survey of a thick film hybrid microcircuit manufacturer's management, production activities, tests facilities, and technical skills is presented. It provides the procuring activity with an evaluation of the manufacturer's ability to execute a contract successfully and of his capability to supply high reliability space hardware. ESA

N91-23397# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands). Product Assurance and Safety Dept.

CHECKLIST FOR THIN-FILM HYBRID MICROCIRCUITS MANUFACTURER AND LINE SURVEY

Nov. 1990 61 p
(ESA-PSS-01-611-ISSUE-1; ISSN-0379-4059; ETN-91-99340)
Copyright Avail: NTIS HC/MF A04

A checklist intended for use in the capability survey of a thin film hybrid microcircuit manufacturer's management, production activities, test facilities and technical skills is presented. It provides the procuring activity with an evaluation of the manufacturer's ability to execute a contract successfully and of his capability to supply high reliability hardware. ESA

N91-28122*# Howard Univ., Washington, DC. Dept. of Electrical Engineering.

ENGINEERING MANAGEMENT OF LARGE SCALE SYSTEMS

SERITA SANDERS, TEPPER L. GILL, and ARTHUR S. PAUL /in Alabama A & M Univ., NASA-HBCU Space Science and Engineering Research Forum Proceedings p 443-449 1989
Avail: NTIS HC/MF A23 CSCL 05/1

The organization of high technology and engineering problem

solving, has given rise to an emerging concept. Reasoning principles for integrating traditional engineering problem solving with system theory, management sciences, behavioral decision theory, and planning and design approaches can be incorporated into a methodological approach to solving problems with a long range perspective. Long range planning has a great potential to improve productivity by using a systematic and organized approach. Thus, efficiency and cost effectiveness are the driving forces in promoting the organization of engineering problems. Aspects of systems engineering that provide an understanding of management of large scale systems are broadly covered here. Due to the focus and application of research, other significant factors (e.g., human behavior, decision making, etc.) are not emphasized but are considered. Author

N91-28244*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.

MANUFACTURING PROCESSES

JAY BENNET, DAVID BROWER, STAN LEVINE, RAY WALKER, and JOHN WOOTEN (Rockwell International Corp., Canoga Park, CA.) /in NASA, Washington, Space Transportation Propulsion Technology Symposium. Volume 3: Panel Session Summaries and Presentations p 953-959 May 1991
Avail: NTIS HC/MF A99 CSCL 21/8

The following issues are covered: process development frequently lags behind material development, high fabrication costs, flex joints (bellows) - a continuing program, SRM fabrication-induced defects, and in-space assembly will require simplified design. Author

N91-28247*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, OH.

CONCURRENT ENGINEERING

C. C. CHAMIS, L. LEGER, D. HUNTER, C. JONES, R. SPRAGUE, L. BERKE, J. NEWELL, and S. SINGHAL (Sverdrup Technology, Inc., Brook Park, OH.) /in NASA, Washington, Space Transportation Propulsion Technology Symposium. Volume 3: Panel Session Summaries and Presentations p 973-988 May 1991
Avail: NTIS HC/MF A99 CSCL 21/8

The following subject areas are covered: issues (liquid rocket propulsion - current development approach, current certification process, and costs of engineering changes); state of the art (DICE information management system, key government participants, project development strategy, quality management, and numerical propulsion system simulation); needs identified; and proposed program. Author

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ROBOTICS AND EXPERT SYSTEMS

Includes Artificial Intelligence, Robots and Robotics, Automatic Control and Cybernetics, Expert Systems, Automation Applications, Computer-Aided Design (CAD), Computer-Aided Manufacturing.

A91-10103#

AUTOMATION AND ROBOTIC ACTIVITIES IN WP-2

RICK G. NORNHOLM and STEVEN D. FLEISCHAKER (McDonnell Douglas Space Systems Co., Huntington Beach, CA) AIAA, Space Programs and Technologies Conference, Huntsville, AL, Sept. 25-27, 1990. 9 p.
(AIAA PAPER 90-3704) Copyright

The status of the automation and robotics activities in the Space Station Freedom program's Work Package Two (WP-2) is briefly reviewed. The discussion covers the development of the EVA-Robotic Design Standards document and the Robotic ORU Assembly and Maintenance methodology, robotic simulation efforts, testing and verification of the robot compatibility of hardware, flight Telerobotic Service integration with Space Station hardware, and the Robot Friendly Working Group. V.L.

A91-13748#

**HOW ARTIFICIAL INTELLIGENCE CAN IMPROVE
MAN-MACHINE INTERFACE - PRACTICAL EXAMPLE WITH
EXTRAVEHICULAR ACTIVITIES**

P. DUPRAT, S. BERTHIER, P. NORRY, J. P. GAUTIER, and J. R. CHEVALLIER (Dassault Aviation, Saint-Cloud, France) IAF, International Astronautical Congress, 41st, Dresden, Federal Republic of Germany, Oct. 6-12, 1990. 6 p.
(IAF PAPER 90-026) Copyright

The integration of artificial intelligence into the man-machine interface of an EVA spacesuit is demonstrated. This EVA suit matches demonstration requirements with a medium-complexity system and highly constrained operations involving reduced mobility and visibility in a harsh environment. The main functions involved in information and control, communication, and data management are outlined, and the functionalities explored in the study are summarized. The roles of the media and information managers are discussed, and the system architecture and implementation are briefly addressed. C.D.

A91-24524#

**COMPUTERAIDED CONCEPTUAL AIRCRAFT
CONFIGURATION DEVELOPMENT BY AN INTEGRATED
OPTIMIZATION APPROACH**

C. HABERLAND, W. FENSKE, O. KRANZ, and R. STOER (Berlin, Technische Universitaet, Federal Republic of Germany) IN: ICAS, Congress, 17th, Stockholm, Sweden, Sept. 9-14, 1990, Proceedings. Vol. 2. Washington, DC, American Institute of Aeronautics and Astronautics, Inc., 1990, p. 2164-2173. refs
Copyright

The objective of the conceptual design phase is the development of the aircraft configuration which is most efficient for a given specification. To numerically assist this procedure a CAE-system is presented which, as main attributes, handles arbitrary analysis and synthesis methods as modules in a method library, applies an always consistent and complete computer internal modeling of geometry and performance, and controls the design processing through a design management system as a central user interface. To point out the potential of this open program architecture, and, in particular, the modeling approach chosen, an aerodynamic analysis of complete aircraft configurations is discussed. Furthermore, it can be shown that paralleling the multivariate optimization with the design synthesis leads to a more efficient strategy than the conventional successive procedure. With this integrated optimization approach a comparative concept evaluation can be performed. Author

A91-24874*# Old Dominion Univ., Norfolk, VA.

**ANALYSIS OF QUALITY COSTS - A CRITICAL ELEMENT IN
CIM**

RESIT UNAL (Old Dominion University, Norfolk, VA) and EDWIN B. DEAN (NASA, Langley Research Center, Hampton, VA) International Conference on CAD/CAM, 5th, Norfolk, VA, Dec. 2-5, 1990, Paper. 8 p. refs

Computer integrated manufacturing (CIM) is a cohesive database of manufacturing information, providing an opportunity to track quality costs and measure progress toward their reduction. This paper presents the quality cost concept as an approach to identify, measure and reduce quality costs while improving quality within CIM. The effect of advanced failure prevention methodologies, such as continuous process improvement and the quality engineering methods of Taguchi, on quality and cost, is discussed. Author

A91-27722

COLUMBUS GENERIC ELEMENT MANAGEMENT CONCEPT

JOHN SVED (MBB/ERNO Raumfahrttechnik GmbH, Bremen, Federal Republic of Germany) IN: Engineering, construction, and operations in space II; Proceedings of Space 90, the Second International Conference, Albuquerque, NM, Apr. 22-26, 1990. Vol. 2. New York, American Society of Civil Engineers, 1990, p. 1472-1481.
Copyright

The concept for largely autonomous onboard management of the ESA Columbus project elements relies on the automation of operational procedures. Reconfigurable items are commanded in sequence during execution of automated procedures that ensure failure management during indeterminate system states. At other times a new form of generalized decision tables will deal with incomplete failure symptoms. Unacceptable operations are avoided by the management of execution of a planned timeline of predefined actions. The concept supports both unmanned and manned systems. Author

A91-30989

**KNOWLEDGE BASE DOCUMENTATION - A PRODUCTIVITY
TOOL FOR LARGE KNOWLEDGE BASES**

JOSEPH E. TATEM (Texas Instruments, Inc., Dallas) IN: NAECON 90; Proceedings of the IEEE National Aerospace and Electronics Conference, Dayton, OH, May 21-25, 1990. Vol. 3. New York, Institute of Electrical and Electronics Engineers, Inc., 1990, p. 1092-1094. refs
Copyright

KBDoc is a report-generating facility that makes use of information found in a knowledge base and information from an external database to produce a document that describes the knowledge base. The database is useful for tracking the progress of the knowledge acquisition effort as the knowledge base is being built. The document produced by the system is useful for maintenance, validation, and verification of the knowledge base, as well as for meeting customer documentation requirements. KBDoc was developed for the FRESH program, a DARPA-sponsored command and control program used to assist the Navy in managing its fleet resources. KBDoc is a custom LISP program that goes through the knowledge base and assembles the documentation for each piece of knowledge. It is a simple program that is built around the structure of the FRESH knowledge base. The KBDoc system is described. The use of this tool in large expert system development is discussed. I.E.

A91-31027

**IMPROVED FLIGHTLINE DIAGNOSTICS USING AN EXPERT
MAINTENANCE TOOL (XMAN II)**

JEFF A. FRENSTER and RONALD L. DEHOFF (Systems Control Technology, Inc., Palo Alto, CA) IN: NAECON 90; Proceedings of the IEEE National Aerospace and Electronics Conference, Dayton, OH, May 21-25, 1990. Vol. 3. New York, Institute of Electrical and Electronics Engineers, Inc., 1990, p. 1354-1357. refs
Copyright

SCT has developed an expert maintenance tool (XMAN II) to assist the technician in evaluating engine monitoring system (EMS) data. The design and function of the XMAN II system are described, and a sample troubleshooting session to demonstrate the diagnostic and user interface features resident in the XMAN II program are discussed. XMAN II implements a comprehensive information analysis technology using a knowledge-based algorithmic approach. Information analysis in this context means the application of structured and unstructured methods to data recorded from remote sensors and manual tests for the purpose of deducing facts about the physical system, including actual condition, imbedded faults, and health prognosis. The information resides in databases. Methods are stored in knowledge bases. XMAN II implements a seamless integration of data, knowledge, and control. I.E.

A91-33677

UNCERTAINTY, INFORMATION AND ESTIMATION

G. C. GOODWIN, M. E. SALGADO (Newcastle, University, Australia), and D. Q. MAYNE (Imperial College of Science, Technology, and Medicine, London, England) IN: Adaptive systems in control and signal processing 1989; Selected Papers from the 3rd IFAC Symposium, Glasgow, Scotland, Apr. 19-21, 1989. Oxford, England and Elmsford, NY, Pergamon Press, 1990, p. 7-15. refs
Copyright

04 ROBOTICS AND EXPERT SYSTEMS

This paper aims to explore the role played by uncertainty in control system design with emphasis on estimation and adaptation. It is argued that a key issue in design is the fidelity of the model. If the model is known to be a perfect description of the system, then optimal performance can be achieved. However, model uncertainty, disturbances and noise place fundamental limits on the achievable performance. Estimation can be viewed as a mechanism for reducing model uncertainty and thus as a way of improving performance. However, a crucial factor in this context is that the estimator should not only yield a nominal model, but also give a measure of confidence in that model. It is shown how such a measure might be obtained and how this allows adaptation and robust design to be integrated into a unified design philosophy. Author

A91-34957#

A MONITORING AND CONTROL SYSTEM FOR COMPLEX MAN-MACHINE SYSTEMS - PRELIMINARY DESIGN

MAHER NESSIM (Centre for Frontier Engineering Research, Canada), LYNN SUTHERLAND, BREEN LIBLONG, and VICKITT LAU (Alberta Research Council, Calgary, Canada) IN: CASI Conference on Astronautics, 6th, Ottawa, Canada, Nov. 19-21, 1990, Proceedings. Ottawa, Canadian Aeronautics and Space Institute, 1990, p. 332-344. Canadian Space Agency-supported research.

A project intended to establish proof-of-concept for a real-time Intelligent Monitoring and Control Software System is discussed. The software design uses artificial intelligence and probabilistic techniques for monitoring and control of complex systems. The design supports real-time response, knowledge-based reasoning, modeling of uncertainty, and an intelligent user interface. The main functional modules of the system include a monitoring and control planner, a sensor data analyzer, a system status assessment module, a diagnosis module, a control action planner, and an updating reporting module. O.G.

A91-37969* Martin Marietta Corp., Denver, CO.

MANAGING AUTONOMY LEVELS IN THE SSM/PMAD TESTBED

BARRY R. ASHWORTH (Martin Marietta Astronautics Group, Denver, CO) IN: IECEC-90; Proceedings of the 25th Intersociety Energy Conversion Engineering Conference, Reno, NV, Aug. 12-17, 1990. Vol. 1. New York, American Institute of Chemical Engineers, 1990, p. 263-268. refs (Contract NAS8-36433) Copyright

It is pointed out that when autonomous operations are mixed with those of a manual nature, concepts concerning the boundary of operations and responsibility become clouded. The space station module power management and distribution (SSM/PMAD) automation testbed has the need for such mixed-mode capabilities. The concept of managing the SSM/PMAD testbed in the presence of changing levels of autonomy is examined. A knowledge-based approach to implementing autonomy management in the distributed SSM/PMAD utilizing a centralized planning system is presented. Its knowledge relations and system-wide interactions are discussed, along with the operational nature of the currently functioning SSM/PMAD knowledge-based systems. I.E.

A91-37970* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, OH.

AUTOMATED ELECTRIC POWER MANAGEMENT AND CONTROL FOR SPACE STATION FREEDOM

JAMES L. DOLCE, PAMELA A. MELLOR, and JAMES A. KISH (NASA, Lewis Research Center, Cleveland, OH) IN: IECEC-90; Proceedings of the 25th Intersociety Energy Conversion Engineering Conference, Reno, NV, Aug. 12-17, 1990. Vol. 1. New York, American Institute of Chemical Engineers, 1990, p. 269-274. Previously announced in STAR as N90-23125. refs Copyright

A comprehensive automation design is being developed for Space Station Freedom's electric power system. It strives to increase station productivity by applying expert systems and

conventional algorithms to automate power system operation. An integrated approach to the power system command and control problem is defined and used to direct technology development in: diagnosis, security monitoring and analysis, battery management, and cooperative problem-solving for resource allocation. The prototype automated power system is developed using simulations and test-beds. Author

A91-37981

KNOWLEDGE-BASED QUALITATIVE MODELLING AND ADAPTIVE DISTRIBUTION OF POWER

STEPHEN CHIU, SUJEET CHAND (Rockwell International Science Center, Thousand Oaks, CA), and IRVING CHEN (Rockwell International Corp., Space Transportation Systems Div., Downey, CA) IN: IECEC-90; Proceedings of the 25th Intersociety Energy Conversion Engineering Conference, Reno, NV, Aug. 12-17, 1990. Vol. 1. New York, American Institute of Chemical Engineers, 1990, p. 353-357. Rockwell International Corp.-supported research. refs Copyright

A sudden surge in power demand or a reduction in power supply aboard a vehicle typically requires the removal of the less critical loads to maintain the operation of the more critical ones. A method that automates the distribution of partial power to maximize overall vehicle functionality has been developed. In addition to the use of priority values, fuzzy sets are used to represent the relationships between the fully functional state of a load and its input power. Using this description, power is iteratively distributed to the loads using fuzzy logic decision rules, taking into account the priority of each load and its power requirement relative to the remaining loads in the set. This algorithm represents an initial alternative to the conventional all-or-none power distribution method. The algorithm is efficient and practical for real-time power redistribution during contingencies. Simulation results that demonstrate the effectiveness of the proposed approach are presented. I.E.

A91-37996* Jet Propulsion Lab., California Inst. of Tech., Pasadena.

GALILEO SPACECRAFT POWER MANAGEMENT AND DISTRIBUTION SYSTEM

R. C. DETWILER and R. L. SMITH (JPL, Pasadena, CA) IN: IECEC-90; Proceedings of the 25th Intersociety Energy Conversion Engineering Conference, Reno, NV, Aug. 12-17, 1990. Vol. 1. New York, American Institute of Chemical Engineers, 1990, p. 446-451. Copyright

The Galileo PMAD (power management and distribution system) is described, and the design drivers that established the final as-built hardware are discussed. The spacecraft is powered by two general-purpose heat-source-radioisotope thermoelectric generators. Power bus regulation is provided by a shunt regulator. Galileo PMAD distributes a 570-W beginning of mission (BOM) power source to a user complement of some 137 load elements. Extensive use of pyrotechnics requires two pyro switching subassemblies. They initiate 148 squibs which operate the 47 pyro devices on the spacecraft. Detection and correction of faults in the Galileo PMAD is an autonomous feature dictated by requirements for long life and reliability in the absence of ground-based support. Volatile computer memories in the spacecraft command and data system and attitude control system require a continuous source of backup power during all anticipated power bus fault scenarios. Power for the Jupiter Probe is conditioned, isolated, and controlled by a Probe interface subassembly. Flight performance of the spacecraft and the PMAD has been successful to date, with no major anomalies. I.E.

A91-38000* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, AL.

DEVELOPMENT OF AN AUTOMATED ELECTRICAL POWER SUBSYSTEM TESTBED FOR LARGE SPACECRAFT

DAVID K. HALL and LOUIS F. LOLLAR (NASA, Marshall Space Flight Center, Huntsville, AL) IN: IECEC-90; Proceedings of the 25th Intersociety Energy Conversion Engineering Conference,

Reno, NV, Aug. 12-17, 1990. Vol. 1. New York, American Institute of Chemical Engineers, 1990, p. 467-470. refs
Copyright

The NASA Marshall Space Flight Center (MSFC) has developed two autonomous electrical power system breadboards. The first breadboard, the autonomously managed power system (AMPS), is a two power channel system featuring energy generation and storage and 24-kW of switchable loads, all under computer control. The second breadboard, the space station module/power management and distribution (SSM/PMAD) testbed, is a two-bus 120-Vdc model of the Space Station power subsystem featuring smart switchgear and multiple knowledge-based control systems. NASA/MSFC is combining these two breadboards to form a complete autonomous source-to-load power system called the large autonomous spacecraft electrical power system (LASEPS). LASEPS is a high-power, intelligent, physical electrical power system testbed which can be used to derive and test new power system control techniques, new power switching components, and new energy storage elements in a more accurate and realistic fashion. LASEPS has the potential to be interfaced with other spacecraft subsystem breadboards in order to simulate an entire space vehicle. The two individual systems, the combined systems (hardware and software), and the current and future uses of LASEPS are described. I.E.

A91-38160

BPE - A REAL-TIME EXPERT SYSTEM FOR AUTONOMOUS POWER MANAGEMENT

ROBERT J. SPIER and MARK E. LIFFRING (Boeing Aerospace and Electronics, Seattle, WA) IN: IECEC-90; Proceedings of the 25th Intersociety Energy Conversion Engineering Conference, Reno, NV, Aug. 12-17, 1990. Vol. 6. New York, American Institute of Chemical Engineers, 1990, p. 21-25. refs
Copyright

The most recent developments in the Boeing Aerospace Autonomous Power System (APS) testbed are presented. The APS testbed is a dc system with 3-kW capability that was assembled for use in developing improved control techniques for aerospace electrical power systems. The emphasis is on a new expert system shell developed by Boeing specifically for the real-time control of electrical power systems (EPS). The capabilities of this shell, called the Blackboard Programming Environment (BPE), were shown through a series of demonstrations. The advantages of this programming environment for autonomous control and the results of the demonstrations are discussed. I.E.

A91-47789

THE ELECTRONIC COPILOT - A FRUITFUL EXPERIENCE TOWARD COMPLEX PROJECT MANAGEMENT USING ARTIFICIAL INTELLIGENCE IN THE SPACE DOMAIN

YANN RENAULT and GILLES CHAMPIGNEUX (Dassault Aviation, Saint-Cloud, France) IN: The management of large software projects in the space industry; Colloquium, Toulouse, France, Oct. 16-18, 1990, Proceedings. Toulouse, France, Cepadues-Editions, 1991, p. 443-462. refs
Copyright

Current experience is presented of how knowledge engineering methods should be employed for expertise initial design and then supplemented by extensive knowledge evaluation and refinement in a simulator, and in some cases by automatic knowledge generation tools. It is shown that the concept described of an electronic copilot, could be usefully applied to space projects. Three examples of potential applications are identified and developed: an electronic assistant for the astronaut in IVA for combined EVA/robotics activities during in-orbit servicing operations, an electronic assistant flight controller for real-time telemetry data evaluation during manned space flights, and an electronic assistant for the 'smart evaluation' of the crew during intensive operations training. R.E.P.

A91-51213

SOLVING SCHEDULING PROBLEM IN OPERATIONS MANAGEMENT USING A TEMPORAL CONSTRAINT REASONING SYSTEM

ALEX C. MENG and MICHAEL SULLIVAN (Texas Instruments, Inc., Dallas) IN: Applications of artificial intelligence VIII; Proceedings of the Meeting, Orlando, FL, Apr. 17-19, 1990. Bellingham, WA, Society of Photo-Optical Instrumentation Engineers, 1990, p. 736-745. refs
Copyright

This paper discusses the use of temporal constraint satisfaction in solving scheduling problems in the operation management domain. The Logos constraint reasoning system implements the constraint propagation paradigm to solve the temporal constraint satisfaction problem. It is shown that temporal relationships provide a richer model to express the scheduling constraints than the precedence relationship. Furthermore, the temporal constraint system can model the dynamic perturbation of the events and their impact on the schedule. This paper presents examples that illustrate how Logos can model scheduling problems and how Logos can use this model to suggest rescheduling actions in response to schedule degradations. Author

A91-51799

DESIGN METHODOLOGY FOR SPACE AUTOMATION AND ROBOTICS SYSTEMS

A. ELFVING (ESTEC, Noordwijk, Netherlands) and U. KIRCHHOFF (Isytec, Bremen, Federal Republic of Germany) ESA Journal (ISSN 0379-2285), vol. 15, no. 2, 1991, p. 149-164. refs
Copyright

Logical reference models are derived which postulate the essential functions of an automation and robotics (A&R) system and are employed for structuring operator requirements and transforming them into distinct design solutions. These reference models cover mobile vehicles, robots and process control and reflect the manner in which the system is to be operated (automatic or teleoperated). The methodology can be extended to encompass other related A&R subjects, e.g., 'designing for automation' and 'group technology' to ensure efficient development within ESA. R.E.P.

N91-10647# Rolls-Royce Ltd., Bristol (England).

FULLY AUTOMATIC ANALYSIS IN AN INDUSTRIAL ENVIRONMENT

I. ARMSTRONG and T. EDMUNDS Derby, England 15 May 1989 12 p Presented at 2nd International Conference on Quality Assurance and Standards in Finite Elements Analysis, May 1989 (PNR-90722; ETN-90-97947) Copyright Avail: NTIS HC/MF A03

Part of the Computer Aided Engineering and Manufacturing (CAEM) project is described. The objective of CAEM is to halve the time between commitment to an engine and entry into service. A two dimensional automatic finite element analysis facility is described. This is designed to contribute to the CAEM project objective by reducing the elapsed time to perform a high quality finite element analysis of the circumferentially averaged response of main engine rotor systems. This allows these analyses to be performed earlier in a design's evolution and increases confidence in the design prior to commitment to manufacture. ESA

N91-12232# California Univ., Berkeley. Lawrence Berkeley Lab. Applied Science Div.

THE PRACTICAL COMPUTER IN DESIGN

JENNIFER SCHUMAN and GREGORY WARD Jul. 1990 6 p Presented at the 5th International Conference on Systems Research, Informatics, and Cybernetics, Baden-Baden, Fed. Republic of Germany, 6-12 Aug. 1990 Submitted for publication (Contract DE-AC03-76SF-00098) (DE91-000353; LBL-29301; BS-276; CONF-9008156-1) Avail: NTIS HC/MF A02

Electronic information processing is becoming a necessity in today's complex design environment. The appropriate role for the

04 ROBOTICS AND EXPERT SYSTEMS

computer in the design process is examined. Computation should be applied throughout all design phases, but practicing designers today rarely use computers beyond simple word processing and drafting tasks. While many design tasks are poorly matched to the computer, other pragmatic and productive avenues remain unexploited. We discuss the need to recognize which elements of the design process are most suited to computer assistance. The role of the computer is designed as an objective assistant to the designer, and practical approaches are discussed in two application areas for computers in design: design simulation and resource information management. DOE

N91-16616# Electronics Research Lab., Adelaide (Australia). Communications Div.

XSHELL: A GENERAL PURPOSE EXPERT SYSTEM SHELL

ALLAN J. MACK May 1990 31 p

(AD-A228454; ERL-0509-RE; DODA-AR-005-997) Avail: NTIS HC/MF A03 CSCL 12/5

An expert system shell is a computer program which is ideally independent of the domain (subject) of application. A problem is represented by facts and rules which the shell processes as data. Although it may be large, the shell is a conventional procedural program. The shell described is the result of a study of existing shells and of the needs of the Intelligent Frequency Management System. The outcome is a comprehensive tool for the development, execution and maintenance of rule-based expert systems. Several unique features can ensure a high level of completeness, reliability and maintainability in the application. The degree of detail which follows is provided not only as a guide to users but also as a reference for the assessment of specification of other shells. This issue refers to XSHELL version 2.11. Expert systems usually divide the rules and facts into the domain, which describes the general case, and the context, which is the part that can vary from one problem to another. In XSHELL, facts and rules describe the problem domain. The assignment of certainties and values to the facts describes the context. The solution of problems is goal driven using a combination of backward and forward chaining. Each fact is described by a text. Associated with each fact is either a set of descriptive states each having a probability (certainty), or a numeric value (or array of values). The descriptive facts are referred to as being qualified and the numeric facts as quantified. GRA

N91-19751# Pacific Northwest Lab., Richland, WA.

TECHNOLOGY MODERNIZATION ASSESSMENT FLEXIBLE AUTOMATION

D. W. BENNETT, D. R. BOYD, N. H. HANSEN, M. A. HANSEN, and J. A. YOUNT Dec. 1990 75 p

(Contract DE-AC06-76RL-01830)

(DE91-005620; PNL-7329) Avail: NTIS HC/MF A04

The objectives of this report are to present technology assessment guidelines to be considered in conjunction with defense regulations before an automation project is developed, to give examples showing how assessment guidelines may be applied to a current project, and to present several potential areas where automation might be applied successfully in the depot system. Depots perform primarily repair and remanufacturing operations, with limited small batch manufacturing runs. While certain activities (such as Management Information Systems and warehousing) are directly applicable to either environment, the majority of applications will require combining existing and emerging technologies in different ways, with the special needs of depot remanufacturing environment. Industry generally enjoys the ability to make revisions to its product lines seasonally, followed by batch runs of thousands or more. Depot batch runs are in the tens, at best the hundreds, of parts with a potential for large variation in product mix; reconfiguration may be required on a week-to-week basis. This need for a higher degree of flexibility suggests a higher level of operator interaction, and, in turn, control systems that go beyond the state of the art for less flexible automation and industry in general. This report investigates the benefits and barriers to automation and concludes that, while significant benefits do exist for automation, depots must be prepared to carefully investigate the technical feasibility of each opportunity and the life-cycle costs

associated with implementation. Implementation is suggested in two ways: (1) develop an implementation plan for automation technologies based on results of small demonstration automation projects; (2) use phased implementation for both these and later stage automation projects to allow major technical and administrative risk issues to be addressed. DOE

N91-20679*# General Dynamics Corp., San Diego, CA. Space Systems Div.

EXPERT SYSTEM DECISION SUPPORT FOR LOW-COST LAUNCH VEHICLE OPERATIONS

G. P. SZATKOWSKI and BARRY E. LEVIN In NASA, Lyndon B. Johnson Space Center, Fourth Annual Workshop on Space Operations Applications and Research (SOAR 90) p 304-316 Jan. 1991 Sponsored in part by AFSD

Avail: NTIS HC/MF A21 CSCL 22/2

Progress in assessing the feasibility, benefits, and risks associated with AI expert systems applied to low cost expendable launch vehicle systems is described. Part one identified potential application areas in vehicle operations and on-board functions, assessed measures of cost benefit, and identified key technologies to aid in the implementation of decision support systems in this environment. Part two of the program began the development of prototypes to demonstrate real-time vehicle checkout with controller and diagnostic/analysis intelligent systems and to gather true measures of cost savings vs. conventional software, verification and validation requirements, and maintainability improvement. The main objective of the expert advanced development projects was to provide a robust intelligent system for control/analysis that must be performed within a specified real-time window in order to meet the demands of the given application. The efforts to develop the two prototypes are described. Prime emphasis was on a controller expert system to show real-time performance in a cryogenic propellant loading application and safety validation implementation of this system experimentally, using commercial-off-the-shelf software tools and object oriented programming techniques. This smart ground support equipment prototype is based in C with imbedded expert system rules written in the CLIPS protocol. The relational database, ORACLE, provides non-real-time data support. The second demonstration develops the vehicle/ground intelligent automation concept, from phase one, to show cooperation between multiple expert systems. This automated test conductor (ATC) prototype utilizes a knowledge-bus approach for intelligent information processing by use of virtual sensors and blackboards to solve complex problems. It incorporates distributed processing of real-time data and object-oriented techniques for command, configuration control, and auto-code generation. Author

N91-20684*# Mitre Corp., Houston, TX.

A FAILURE MANAGEMENT PROTOTYPE: DR/RX

DAVID G. HAMMEN, CAROLYN G. BAKER, CHRISTINE M. KELLY, and CHRISTOPHER A. MARSH In NASA, Lyndon B. Johnson Space Center, Fourth Annual Workshop on Space Operations Applications and Research (SOAR 90) p 347-354 Jan. 1991 (Contract NAS9-18057)

Avail: NTIS HC/MF A21 CSCL 14/4

This failure management prototype performs failure diagnosis and recovery management of hierarchical, distributed systems. The prototype, which evolved from a series of previous prototypes following a spiral model for development, focuses on two functions: (1) the diagnostic reasoner (DR) performs integrated failure diagnosis in distributed systems; and (2) the recovery expert (RX) develops plans to recover from the failure. Issues related to expert system prototype design and the previous history of this prototype are discussed. The architecture of the current prototype is described in terms of the knowledge representation and functionality of its components. Author

N91-20689*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, OH.

AUTONOMOUS POWER EXPERT SYSTEM ADVANCED DEVELOPMENT

TODD M. QUINN (Sverdrup Technology, Inc., Brook Park, OH.)

and JERRY L. WALTERS /In NASA, Lyndon B. Johnson Space Center, Fourth Annual Workshop on Space Operations Applications and Research (SOAR 90) p 383-390 Jan. 1991
 Avail: NTIS HC/MF-A21 CSCL 10/2

The autonomous power expert (APEX) system is being developed at Lewis Research Center to function as a fault diagnosis advisor for a space power distribution test bed. APEX is a rule-based system capable of detecting faults and isolating the probable causes. APEX also has a justification facility to provide natural language explanations about conclusions reached during fault isolation. To help maintain the health of the power distribution system, additional capabilities were added to APEX. These capabilities allow detection and isolation of incipient faults and enable the expert system to recommend actions/procedure to correct the suspected fault conditions. New capabilities for incipient fault detection consist of storage and analysis of historical data and new user interface displays. After the cause of a fault is determined, appropriate recommended actions are selected by rule-based inferencing which provides corrective/extended test procedures. Color graphics displays and improved mouse-selectable menus were also added to provide a friendlier user interface. A discussion of APEX in general and a more detailed description of the incipient detection, recommended actions, and user interface developments during the last year are presented.

Author

N91-20690*# Boeing Computer Services Co., Huntsville, AL. Artificial Intelligence Center.

A KNOWLEDGE-BASED APPROACH TO CONFIGURATION LAYOUT, JUSTIFICATION, AND DOCUMENTATION

F. G. CRAIG, D. E. CUTTS, T. R. FENNEL, C. M. CASE, and J. R. PALMER (Boeing Aerospace and Electronics Co., Huntsville, AL.) /In NASA, Lyndon B. Johnson Space Center, Fourth Annual Workshop on Space Operations Applications and Research (SOAR 90) p 393-396 Jan. 1991 Previously announced in IAA as A90-27286

Copyright Avail: NTIS HC/MF A21 CSCL 12/1

The design, development, and implementation of a prototype expert system which could aid designers and system engineers in the placement of racks aboard modules on the Space Station Freedom are described. This type of problem is relevant to any program with multiple constraints and requirements demanding solutions which minimize usage of limited resources. This process is generally performed by a single, highly experienced engineer who integrates all the diverse mission requirements and limitations, and develops an overall technical solution which meets program and system requirements with minimal cost, weight, volume, power, etc. This system architect performs an intellectual integration process in which the underlying design rationale is often not fully documented. This is a situation which lends itself to an expert system solution for enhanced consistency, thoroughness, documentation, and change assessment capabilities.

Author

N91-20692*# Princeton Univ., NJ. Dept. of Mechanical and Aerospace Engineering.

QUANTITATIVE KNOWLEDGE ACQUISITION FOR EXPERT SYSTEMS

BRENDA L. BELKIN and ROBERT F. STENGEL /In NASA, Lyndon B. Johnson Space Center, Fourth Annual Workshop on Space Operations Applications and Research (SOAR 90) p 405-413 Jan. 1991

(Contract NGL-31-001-252; DAAG29-84-K-0048)

Avail: NTIS HC/MF A21 CSCL 09/2

A common problem in the design of expert systems is the definition of rules from data obtained in system operation or simulation. While it is relatively easy to collect data and to log the comments of human operators engaged in experiments, generalizing such information to a set of rules has not previously been a direct task. A statistical method is presented for generating rule bases from numerical data, motivated by an example based on aircraft navigation with multiple sensors. The specific objective is to design an expert system that selects a satisfactory suite of measurements from a dissimilar, redundant set, given an arbitrary

navigation geometry and possible sensor failures. The systematic development is described of a Navigation Sensor Management (NSM) Expert System from Kalman Filter covariance data. The method invokes two statistical techniques: Analysis of Variance (ANOVA) and the ID3 Algorithm. The ANOVA technique indicates whether variations of problem parameters give statistically different covariance results, and the ID3 algorithms identifies the relationships between the problem parameters using probabilistic knowledge extracted from a simulation example set. Both are detailed.

Author

N91-20810# Lockheed Missiles and Space Co., Palo Alto, CA. Artificial Intelligence Center.

ADAPTIVE INTERFACES Final Report, Mar. 1989 - May 1990

SHERMAN W. TYLER Nov. 1990 29 p

(Contract F30602-87-D-0087)

(AD-A229751; RADC-TR-90-276) Avail: NTIS HC/MF A03

CSCL 23/2

The purpose of this research and development endeavor was to design and implement an adaptive intelligent interface for a command-and-control style domain. The primary functionality of the resulting interface was to be able to adapt its presentation of information to the individual user, based upon the current task and the user's personal preferences and experiences as captured in an explicit user model. The CHORIS (Computer Human Object Oriented Reasoning Interface System) software system is a knowledge based intelligent interface architecture which supports mixed modality input and output, high-level plan management, adaptation to individual users and user roles, and tailoring of system response information to the currently executing high-level task and the user's preferences. CHORIS has been extended to support users with different roles within the command-and-control-style domain of emergency management. The interface demonstrates the powerful effects that the functionality captured within CHORIS can have in enhancing user performance in responding to complex situations in a timely manner.

GRA

N91-20980# Air Force Inst. of Tech., Wright-Patterson AFB, OH. School of Systems and Logistics.

AN EMPIRICAL EVALUATION OF THREE KNOWLEDGE ACQUISITION TECHNIQUES FOR DEVELOPING A PROJECT MANAGEMENT RELATED EXPERT SYSTEM M.S. Thesis

TODD T. VIKAN Sep. 1990 102 p

(AD-A230472; AFIT/GSM/LSR/90S-32) Avail: NTIS HC/MF

A06 CSCL 05/1

The acquisition of expert knowledge is recognized as one of the major hurdles facing the expert system programmer or knowledge engineer. Unfortunately, knowledge acquisition is seldom addressed in any detail in expert system literature, even though there exist a number of different techniques that a knowledge engineer can use to capture expert knowledge. The purpose of this study was to identify and evaluate the relative effectiveness of three knowledge acquisition techniques that may be used when developing expert systems for project management related tasks. The three techniques were interview, concept mapping, and interruption analysis. An experiment was conducted and quantitative measures of effectiveness were derived.

GRA

N91-20993# Knowledge Based Systems, Inc. College Station, TX.

DESIGN KNOWLEDGE MANAGEMENT SYSTEM (DKMS) Final Report, Sep. 1989 - Aug. 1990

RICHARD J. MAYER Dec. 1990 143 p

(Contract F41622-89-C-0018)

(AD-A230266; AFHRL-TP-90-81) Avail: NTIS HC/MF A07

CSCL 12/7

This document describes the design knowledge management system (DKMS), which provides a software environment for both the development and the delivery of intelligent assistants. These intelligent assistants can be used for computer-aided design (CAD), computer-aided engineering (CAE), and computer-aided manufacturing (CAM) applications in product design, engineering, manufacturing, and logistics planning. The DKMS can be thought

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of as an integrated concurrent engineering system whose environment includes facilities for: (1) design knowledge representation including shape-based associative retrieval and container objects; (2) intelligent user interface including form feature interfaces and generalized constructive solid geometry (GCSG) engineer, (3) engineering performance modeling functionally including constraint management and bond graph techniques; (4) data integration support; and (5) configuration management. This facility will enable the delivery of design advice on-line to the designer as new definitions are being created. Backing up this geometry engine, a container object management system will be produced that extends the proven composite object capabilities by integrating geometry conceiving and manipulation primitives into the basic object definition and inheritance lattice operators. As an initial manufacturability, reliability, and maintainability capability, the baseline system will include a manufacturability checker, an associated generative process planning system, and an engineering performance model development environment.

GRA

N91-21941*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.

EXPERIMENT DOCUMENT INFORMATION SYSTEM (EDIS) EVOLUTION

JANE MOORHEAD and HENRY BRANS *In* Houston Univ., SEPEC Conference Proceedings: Hypermedia and Information Reconstruction. Aerospace Applications and Research Directions 6 p 1990

Avail: NTIS HC/MF A08 CSDL 05/2

The EDIS is the second generation of a system designed to produce and control a document containing large amounts of text in combination with tables and graphs of mathematical/scientific data. The first generation system proved the concept, but the slow, unfriendly user interface resulted in an effort to find an off-the-shelf product to improve the interface capability while maintaining the system requirements. The basic design of that first system was combined with the hypertext concepts inherent in HyperCard to generate the most usable EDIS. Currently in the latter stages of design, the EDIS promises to be the first step in the automation of the process required for defining complete packages of Life Sciences experiments for the Shuttle missions.

Author

N91-22249# MATRA Espace, Toulouse (France).

KNOWLEDGE BASED FRAMEWORK FOR MAN-SYSTEM INTERACTION IN SPACE CONTROL CENTRES

FRANCOISE CARRE, PASCAL RICHARD, NATHALIE CARN, and NATHALIE AUSSENAC (Centre National de la Recherche Scientifique, Toulouse, France) *In* ESA, Ground Data Systems for Spacecraft Control p 373-378 Oct. 1990

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An object oriented approach used in developing a model of controlled systems, both in spacecraft and in ground segments is discussed. This model is to be used as a kernel for a variety of applications based on artificial intelligence techniques. Operations within a space control center that can be improved by artificial intelligence techniques are outlined. A model based approach for artificial intelligence presupposes emphasis being placed on the knowledge acquisition step. The integration of artificial intelligence techniques in the operational environment is discussed. ESA

N91-22294*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.

TRANSPORTABLE PAYLOAD OPERATIONS CONTROL CENTER

JOHN KOSLOSKY, RONALD MAHMOT, DANIEL MANDL, and WILLIAM STRATTON (Integral Systems, Inc., Lanham, MD.) *In* ESA, Ground Data Systems for Spacecraft Control p 653-658 Oct. 1990

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The Transportable Payload Operations Control Center (TPOCC), an architecture for control centers which makes use of new mission operations and reduces development costs, is described. The

TPOCC architecture takes an open networking approach based on widely accepted industry standards. Small inexpensive computers are networked together, performing the functions of a mini or mainframe computer. This approach, along with TPOCC's reusable components, provides versatile ground support systems for Mission Operations Division's (MOD) customers. ESA

N91-23341*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, CA.

COMPUTATIONAL NEEDS SURVEY OF NASA AUTOMATION AND ROBOTICS MISSIONS. VOLUME 1: SURVEY AND RESULTS

GLORIA J. DAVIS May 1991 30 p

(NASA-TM-103860-VOL-1; A-91093-VOL-1; NAS

1.15:103860-VOL-1) Avail: NTIS HC/MF A03 CSDL 13/2

NASA's operational use of advanced processor technology in space systems lags behind its commercial development by more than eight years. One of the factors contributing to this is that mission computing requirements are frequently unknown, unstated, misrepresented, or simply not available in a timely manner. NASA must provide clear common requirements to make better use of available technology, to cut development lead time on deployable architectures, and to increase the utilization of new technology. A preliminary set of advanced mission computational processing requirements of automation and robotics (A&R) systems are provided for use by NASA, industry, and academic communities. These results were obtained in an assessment of the computational needs of current projects throughout NASA. The high percent of responses indicated a general need for enhanced computational capabilities beyond the currently available 80386 and 68020 processor technology. Because of the need for faster processors and more memory, 90 percent of the polled automation projects have reduced or will reduce the scope of their implementation capabilities. The requirements are presented with respect to their targeted environment, identifying the applications required, system performance levels necessary to support them, and the degree to which they are met with typical programmatic constraints. Volume one includes the survey and results. Volume two contains the appendices. Author

N91-23371# Carnegie-Mellon Univ., Pittsburgh, PA.

DECENTRALIZED COMPUTING TECHNOLOGY FOR FAULT-TOLERANT, SURVIVABLE C3I SYSTEMS. VOLUME 3: SYSTEM/SUBSYSTEM SPECIFICATION Final Report, Aug. 1985 - Dec. 1988

J. D. NORTHCUTT, E. D. JENSEN, EDWARD J. BURKE, RAYMOND K. CLARK, and JAMES G. HANKO Jun. 1990 196 p

(Contract F30602-85-C-0274)

(AD-A232291; RADC-TR-90-101-VOL-3) Avail: NTIS HC/MF A09 CSDL 12/5

Alpha is an operating system for the mission critical integration and operation of large, complex, distributed, real time systems. Such systems are becoming increasingly common in both military (e.g., BM/C3, combat platform management) and industrial factory and plant automation (e.g., automobile manufacturing) contexts. They differ substantially from the better-known timesharing systems, numerically-oriented supercomputers, and networks of personal workstations. More surprisingly, they also depart significantly from traditional real time systems, which are predominately for low-level periodic sampled data monitoring and control. GRA

N91-25139# National Aeronautics and Space Administration. Hugh L. Dryden Flight Research Facility, Edwards, CA.

A KNOWLEDGE-BASED SYSTEM DESIGN/INFORMATION TOOL FOR AIRCRAFT FLIGHT CONTROL SYSTEMS

DALE A. MACKALL and JAMES G. ALLEN (Draper, Charles Stark Lab., Inc., Cambridge, MA) *In* AGARD, Knowledge Based System Applications for Guidance and Control 14 p Apr. 1991

Copyright Avail: NTIS HC/MF A12; Non-NATO Nationals requests available only from AGARD/Scientific Publications Executive CSDL 01/3

Research aircraft have become increasingly dependent on

advanced electronic control systems to accomplish program goals. These aircraft are integrating multiple disciplines to improve performance and satisfy research objective. This integration is being accomplished through electronic control systems. Systems design methods and information management have become essential to program success. The primary objective of the system design/information tool for aircraft flight control is to help transfer flight control system design knowledge to the flight test community. By providing all of the design information and covering multiple disciplines in a structured, graphical manner, flight control systems can more easily be understood by the test engineers. This will provide the engineers with the information needed to thoroughly ground test the system and thereby reduce the likelihood of serious design errors surfacing in flight. The secondary object is to apply structured design techniques to all of the design domains. By using the techniques in the top level system design down through the detailed hardware and software designs, it is hoped that fewer design anomalies will result. The flight test experiences are reviewed of three highly complex, integrated aircraft programs: the X-29 forward swept wing; the advanced fighter technology integration (AFTI) F-16; and the highly maneuverable aircraft technology (HiMAT) program. Significant operating technologies, and the design errors which cause them, is examined to help identify what functions a system design/information tool should provide to assist designers in avoiding errors. Author

N91-26818# Northeast Artificial Intelligence Consortium, Syracuse, NY.

NORTHEAST ARTIFICIAL INTELLIGENCE CONSORTIUM (NAIC). VOLUME 4: DISTRIBUTED ARTIFICIAL INTELLIGENCE FOR COMMUNICATIONS NETWORK MANAGEMENT Final Report, Sep. 1984 - Dec. 1989

ROBERT A. MEYER and SUSAN E. CONRY Dec. 1990 161 p (Contract F30602-85-C-0008) (AD-A234883; RADC-TR-90-404-VOL-4) Avail: NTIS HC/MF A08 CSCL 12/7

The Northeast Artificial Intelligence Consortium (NAIC) was created by the Air Force Systems Command, Rome Air Development Center, and the office of Scientific Research. Its purpose was to conduct pertinent research in artificial intelligence and to perform activities ancillary to this research. This report describes progress during the existence of the NAIC on the technical research tasks undertaken at the member universities. The topics covered in general are: (1) versatile expert system for equipment maintenance; (2) distributed AI for communications system control; (3) automatic photointerpretation; (4) time-oriented problem solving; (5) speech understanding systems; (6) knowledge base maintenance; (7) hardware architectures for very large systems; (8) knowledge based reasoning and planning, and (9) a knowledge acquisition, assistance, and explanation system. The specific topic for this volume is the use of knowledge based systems for communications network management and control via an architecture for a diversely distributed multi-agent system. GRA

N91-27557# Illinois Univ., Urbana. Dept. of Computer Science. **INCREMENTALLY INCREASING THE UNCERTAINTY-TOLERANCE OF ROBOTIC MANIPULATION PLANS**

SCOTT BENNETT and GERALD DEJONG Apr. 1991 23 p (Contract N00014-86-K-0309) (AD-A236852; UIUCDCS-R-91-1685; UIU-ENG-91-1731) Avail: NTIS HC/MF A03 CSCL 12/9

Robotic manipulators control is subject to control and sensing errors which is particularly troublesome in fine motion planning. Several approaches have been taken including propagation of numeric or symbolic uncertainties and generation of plans which use compliant motion to achieve goals in spite of uncertainties. Since approaches have generally sought to guarantee success, plan generation costs are high. We present a new approach to incrementally acquiring uncertainty tolerance in robotic manipulation plans through experience. During plan construction and execution, no reasoning about uncertainty takes place; consequently, plan generation and execution is very fast. However, in response to

failures, plans are refined to increase their uncertainty tolerance so as to reduce the future possibility of the encountered failure. The incremental refinement approach has several advantages over guaranteed plans: (1) resulting plans are general and have explicit applicability conditions; (2) plans achieve a savings because they do not explicitly consider uncertainties; (3) savings are obtained over the guaranteed case since often only a subset of all uncertainties lead to failures in practice; and (4) unguaranteed but practical plans can be generated by the incremental approach when they lie outside the scope of the guaranteed planner. To demonstrate our approach we describe an implemented system called GRASPER which learns to grasp novel objects given only imprecise television camera input. GRA

N91-27773*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, CA.

ADVANCING AUTOMATION AND ROBOTICS TECHNOLOGY FOR THE SPACE STATION FREEDOM AND FOR THE U.S. ECONOMY. SUBMITTED TO THE CONGRESS OF THE U.S. MAY 1991 Progress Report No. 12, 23 Aug. 1990 - 14 Feb. 1991

HENRY LUM, JR. May 1991 44 p (NASA-TM-103851; A-91105; NAS 1.15:103851) Avail: NTIS HC/MF A03 CSCL 22/2

In April 1985, as required by Public Law 98-371, the NASA Advanced Technology Advisory Committee (ATAC) reported to Congress the results of its studies on advanced automation and robotics technology for use on Space Station Freedom. This material was documented in the initial report (NASA Technical Memorandum 87566). A further requirement of the law was that ATAC follow NASA's progress in this area and report to Congress semiannually. The report describes the progress made by Levels 1, 2 and 3 of the Office Space Station in developing and applying advanced automation and robotics technology. Emphasis has been placed upon the Space Station Freedom Program responses to specific recommendations made in ATAC Progress Report 11, the status of the Flight Telerobotic Servicer, and the status of the Advanced Development Program. In addition, an assessment is provided of the automation and robotics status of the Canadian Space Station Program. Author

N91-28784# Oak Ridge National Lab., TN. **PROPOSAL FOR CONTINUED BASIC RESEARCH IN INTELLIGENT MACHINES AT THE CENTER FOR ENGINEERING SYSTEMS ADVANCED RESEARCH: FISCAL YEARS 1992-1996**

R. C. MANN, M. BECKERMAN, K. FUJIMURA, J. P. JONES, E. M. OBLow, F. G. PIN, and M. A. UNSEREN May 1991 120 p (Contract DE-AC05-84OR-21400) (DE91-012997; ORNL/TM-11810; CESAR-91/07) Avail: NTIS HC/MF A06

This proposal describes the context and technical direction during the next five years for the DOE/ER/BES-sponsored basic research program in intelligent machines at the Center for Engineering Systems Advanced Research (CESAR) at the Oak Ridge National Laboratory (ORNL). Research will address issues related to autonomous systems in unstructured dynamic work environments. Specifically, the work will focus on multiple cooperating robotic systems, combined mobility and manipulation, intelligent sensor systems, machine learning, and embedded high performance computing. Focus for proof-of-principle experiments demonstrating innovative development will be delivered from a number of application areas related to DOE missions. DOE

N91-30713*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.

MAKING INTELLIGENT SYSTEMS TEAM PLAYERS: CASE STUDIES AND DESIGN ISSUES. VOLUME 1: HUMAN-COMPUTER INTERACTION DESIGN

JANE T. MALIN, DEBRA L. SCHRECKENGHOST, DAVID D. WOODS, SCOTT S. POTTER, LEILA JOHANNESSEN, MATTHEW HOLLOWAY, and KENNETH D. FORBUS (Northwestern Univ.,

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Evanston, IL.) Sep. 1991 263 p
(NASA-TM-104738-VOL-1; S-643; NAS 1.15:104738) Avail: NTIS
HC/MF A12 CSCL 12/1

Initial results are reported from a multi-year, interdisciplinary effort to provide guidance and assistance for designers of intelligent systems and their user interfaces. The objective is to achieve more effective human-computer interaction (HCI) for systems with real time fault management capabilities. Intelligent fault management systems within the NASA were evaluated for insight into the design of systems with complex HCI. Preliminary results include: (1) a description of real time fault management in aerospace domains; (2) recommendations and examples for improving intelligent systems design and user interface design; (3) identification of issues requiring further research; and (4) recommendations for a development methodology integrating HCI design into intelligent system design. Author

N91-30845 British Aerospace Public Ltd. Co., Preston (England). Software Technology Dept.

DEVELOPMENT METHODOLOGIES FOR KNOWLEDGE BASED SYSTEMS: A COMPARATIVE REVIEW

M. R. BATEMAN 6 Dec. 1990 47 p
(BAE-WIT-RP-GEN-SWE-1996; ETN-91-99837) Copyright Avail:
British Aerospace (Military Aircraft) Ltd., Warton Aerodrome,
Preston, Lancashire, PR4 1 AX, England

A number of Knowledge Based Systems (KBS) development methodologies are described and evaluated. The majority of methodologies reviewed are somewhat superficial and as a consequence do not receive extensive consideration. Three methodologies, namely KADS, Syntel and Alpha/DS are given a more comprehensive discussion. KADS is given particular attention. It is recommended that KADS be further evaluated to determine its suitability for real time and closely coupled conventional and KBS applications. ESA

N91-30992# Softech, Inc., Waltham, MA.

ACTIVITY AND INFORMATION MODELING METHODOLOGY ASSESSMENT Final Report, May - Nov. 1990

CLARENCE G. FELDMAN, RICHARD R. PRESTON, and PAUL S. THOMPSON (Control Data Corp., Dayton, OH.) Apr. 1991 80 p
(Contract F33615-89-C-5708)
(AD-A236234; WL-TR-91-8012) Avail: NTIS HC/MF A05 CSCL 12/7

The objective of this program was to conduct a top-level assessment of activity (IDEF-O) and information (IDEF-1x) modeling methods needed to support overarching enterprise framework applications. The results provide a preliminary strategic plan, or blueprint, tailored to the needs related USAF and industry requirements for integrated information modeling capabilities. The plan is a systematic and incremental approach for strategic improvements relative to enterprise framework applications. GRA

N91-31884 Politecnico di Milano (Italy). Dipt. di Elettronica.

THE PROBLEM OF NETWORK MANAGEMENT: AN APPROACH USING AI TECHNIQUES

L. FAVALLI 1990 23 p
(REPT-90-072; ETN-91-99927) Avail: Politecnico di Milano,
Piazza Leonardo da Vinci 32, 20133 Milan, Italy

The number of problems that may occur in communication networks is growing with their size and complexity. Many of these problems have also special characteristics which make them hard to detect. It may happen that symptoms of an upcoming problem are hidden by other factors or by the overwhelming amount of information going around. The use of expert systems in support of a network manager is seen as a promising approach to troubleshooting, and several prototypes are being developed by different research labs and companies. A system called DIXIE which uses artificial intelligence techniques to monitor and intelligently report on the status of a DECNET environment is introduced. ESA

N91-32135*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, CA.

HUMAN-CENTERED AIRCRAFT AUTOMATION: A CONCEPT AND GUIDELINES

CHARLES E. BILLINGS Aug. 1991 119 p
(NASA-TM-103885; A-91192; NAS 1.15:103885) Avail: NTIS
HC/MF A06 CSCL 01/4

Aircraft automation is examined and its effects on flight crews. Generic guidelines are proposed for the design and use of automation in transport aircraft, in the hope of stimulating increased and more effective dialogue among designers of automated cockpits, purchasers of automated aircraft, and the pilots who must fly those aircraft in line operations. The goal is to explore the means whereby automation may be a maximally effective tool or resource for pilots without compromising human authority and with an increase in system safety. After definition of the domain of the aircraft pilot and brief discussion of the history of aircraft automation, a concept of human centered automation is presented and discussed. Automated devices are categorized as a control automation, information automation, and management automation. The environment and context of aircraft automation are then considered, followed by thoughts on the likely future of automation of that category. Author

N91-32850*# National Aeronautics and Space Administration. Hugh L. Dryden Flight Research Facility, Edwards, CA.

A NASA/RAE COOPERATION IN THE DEVELOPMENT OF A REAL-TIME KNOWLEDGE-BASED AUTOPILOT

COLIN DAYSH, MALCOLM CORBIN, GEOFF BUTLER, EUGENE L. DUKE, STEVEN D. BELLE, and RANDAL W. BRUMBAUGH (PRC Kentron, Inc., Edwards, CA.) Aug. 1991 15 p Presented at the Avionics Panel Symposium, Lisbon, Portugal, May 1991
(NASA-TM-104234; H-1727; NAS 1.15:104234) Avail: NTIS
HC/MF A03 CSCL 09/2

As part of a US/UK cooperative aeronautical research program, a joint activity between the NASA Dryden Flight Research Facility and the Royal Aerospace Establishment on knowledge-based systems was established. This joint activity is concerned with tools and techniques for the implementation and validation of real-time knowledge-based systems. The proposed next stage of this research is described, in which some of the problems of implementing and validating a knowledge-based autopilot for a generic high-performance aircraft are investigated. Author

N91-32851*# National Aeronautics and Space Administration. Hugh L. Dryden Flight Research Center, Edwards, CA.

FROM AN AUTOMATED FLIGHT-TEST MANAGEMENT SYSTEM TO A FLIGHT-TEST ENGINEER'S WORKSTATION

E. L. DUKE, RANDAL W. BRUMBAUGH, M. D. HEWETT, and D. M. TARTT (G and C Systems, Inc., San Juan Capistrano, CA.) Oct. 1991 16 p Presented at the Guidance and Control Panel's 53d Symposium: Air Vehicle Mission Control and Management, Amsterdam, Netherlands, 22-26 Oct. 1991
(NASA-TM-104242; H-1761; NAS 1.15:104242; AGARD-29)
Avail: NTIS HC/MF A03 CSCL 09/2

The capabilities and evolution is described of a flight engineer's workstation (called TEST-PLAN) from an automated flight test management system. The concept and capabilities of the automated flight test management systems are explored and discussed to illustrate the value of advanced system prototyping and evolutionary software development. Author

COMPUTERS AND INFORMATION MANAGEMENT

Includes Information Systems and Theory, Information Dissemination and Retrieval, Management Information Systems, Database Management Systems and Databases, Data Processing, Data Management, Communications and Communication Theory, Documentation and Information Presentation, Software, Software Acquisition, Software Engineering and Management, Computer Systems Design and Performance, Configuration Management (Computers), Networking, Office Automation, Information Security.

A91-10092#**USING TASK ANALYSIS TO GUIDE INFORMATION-TECHNOLOGY DEVELOPMENT FOR FUTURE SPACE MISSIONS**

LEO GUGERTY and PURNA MURTHY (Lockheed Engineering and Sciences Co., Houston, TX) AIAA, Space Programs and Technologies Conference, Huntsville, AL, Sept. 25-27, 1990. 6 p. refs

(AIAA PAPER 90-3683) Copyright

This paper describes a project with the goal of enhancing information technology for future, long duration space missions, such as a Mars mission. The approach being taken involves predicting both trends in information technology and likely crew tasks on long duration missions. A computer database containing information about future information technologies and crew tasks is being developed. Based on these data, certain tasks that will require information technology have been selected. The technique of cognitive task analysis is being used to determine the optimal use of information technologies for these tasks. The paper describes the benefits of cognitive task analysis and how this technique is being used in an in-depth analysis of the task of selecting outpost sites and exploration routes. Author

A91-10139#**RISK MANAGEMENT INTEGRATION WITH SYSTEM ENGINEERING AND PROGRAM MANAGEMENT**

GEORGE J. VLAY (Ford Aerospace Corp., Palo Alto, CA) and LAWRENCE T. BREKKA (BDM International, Inc., McLean, VA) AIAA, Space Programs and Technologies Conference, Huntsville, AL, Sept. 25-27, 1990. 12 p. refs

(AIAA PAPER 90-3773) Copyright

The integration of computerized risk management into a system engineering and program management processes is discussed. Program management using Total Quality Management (TQM) is reviewed, and the ways that such management can be improved by computerized risk management are shown using the BDM Risk Analysis and Management System (BRAMS). The application of BRAMS to assess the risk of achieving launch on schedule of a hypothetical satellite system is examined. The role of TQM in system engineering management is discussed. C.D.

A91-10908*# NASA Space Station Program Office, Reston, VA. SPACE STATION FREEDOM - CONFIGURATION MANAGEMENT APPROACH TO SUPPORTING CONCURRENT ENGINEERING AND TOTAL QUALITY MANAGEMENT

RAYMOND B. GAVERT (NASA, Space Station Freedom Program Office, Reston, VA) IN: Space Logistics Symposium, 3rd, Colorado Springs, CO, Apr. 30-May 2, 1990, Proceedings. Huntsville, AL, Society of Logistics Engineers, 1990, 13 p. refs

Copyright

Some experiences of NASA configuration management in providing concurrent engineering support to the Space Station Freedom program for the achievement of life cycle benefits and total quality are discussed. Three change decision experiences involving tracing requirements and automated information systems of the electrical power system are described. The potential benefits of concurrent engineering and total quality management include improved operational effectiveness, reduced logistics and support

requirements, prevention of schedule slippages, and life cycle cost savings. It is shown how configuration management can influence the benefits attained through disciplined approaches and innovations that compel consideration of all the technical elements of engineering and quality factors that apply to the program development, transition to operations and in operations. Configuration management experiences involving the Space Station program's tiered management structure, the work package contractors, international partners, and the participating NASA centers are discussed. R.E.P.

A91-10930#**CALS AND LOGISTICS MANAGEMENT - HOW LOGISTICS CAN IMPLEMENT THE CALS CONCEPT ON THE SPACE STATION**

D. ALBERG HORTON (Honeywell, Inc., Minneapolis, MN) IN: Space Logistics Symposium, 3rd, Colorado Springs, CO, Apr. 30-May 2, 1990, Proceedings. Huntsville, AL, Society of Logistics Engineers, 1990, 7 p.

The new computer-aided acquisition and logistics support (CALS) developments, intended to lead to weapons systems improvements, and how these developments will benefit the Space Station are presented. Methods by which logistics management, employing CALS focal points, can creatively implement logistics functions in the building and support of the Space Station are discussed. Costs are more likely to continue to decrease as factors in CALS implementation equations continue to change. As a driver, life cycle costs should be applied to CALS implementation. Logistics management at all levels should implement these processes in the Space Station development phases, with resulting savings in space, weight, documentation, and supply costs. R.E.P.

A91-13822#**DATA PROCESSING, STORAGE, INTEGRATION, AND ANALYSIS IN THE MID TO LATE 1990'S**

W. MURRAY STROME (PCI, Inc., Richmond Hill, Canada) IAF, International Astronautical Congress, 41st, Dresden, Federal Republic of Germany, Oct. 6-12, 1990. 7 p. refs

(IAF PAPER 90-135) Copyright

Based on data from remote sensing satellites such as LANDSAT, SPOT, SEASAT, and MOS-1, an information management system is proposed which will be able to process, store, and retrieve the information obtained using satellites and/or in situ measurements, and put it to an effective use. Reliable, large-scale geophysical and biological measurements, obtained using Radarsat, ERS-1, JERS-1, and the Earth Observing System (EOS), will be integrated. Some of the innovations in the processing of satellite data are of Canadian origin. These include quick-look output products; World Reference System for cataloguing satellite imagery; geocoded satellite image products; and digital processing of SAR satellite data. The scientific objectives of the Canadian global change program to be achieved in 1996 include: (1) development of procedures, models, and data handling systems for detecting global changes over Canada; (2) integration of image analysis, geographic information systems, and digital telecommunication networks; and (3) development/implementation of satellite observation programs for global change studies. B.P.

A91-14951#**TRIALS FOR DEVELOPING INFORMATION SYSTEM IN NASDA (SPACE OPERATION INFORMATION SYSTEM FOR JEM ERA)**

S. IGARASHI and S. YAMADA (NASDA, Tokyo, Japan) AIAA and NASA, International Symposium on Space Information Systems, 2nd, Pasadena, CA, Sept. 17-19, 1990. 11 p.

(AIAA PAPER 90-5016) Copyright

NASDA is currently conceptually designing, experimenting and developing Data Information Systems, which are still in cradle phase, toward JEM era. Some of outline of the studies will be introduced and type I SODS and ETS-VI intersatellite communications experiment system, which are under construction as parts of Space Operation and Data System (SODS) will be described. Author

A91-14982*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.

A DESCRIPTION OF THE GLOBAL RESOURCES INFORMATION DATABASE

CHARLES H. VERMILLION (NASA, Goddard Space Flight Center, Greenbelt, MD), O. HEBIN (United Nations Environmental Program, Geneva, Switzerland), and H. KROZE (United Nations Environmental Program, Nairobi, Kenya) AIAA and NASA, International Symposium on Space Information Systems, 2nd, Pasadena, CA, Sept. 17-19, 1990. 5 p. (AIAA PAPER 90-5063) Copyright

This paper describes the Global Resources Information Database (GRID), which is part of the Global Environmental Monitoring (GEM) Program. The following four objectives were established for GRID: (1) to collect and disseminate geographical information; (2) to construct within developing countries a geographical information system (GIS); (3) to demonstrate the ability of GIS to fuse global and national data sets for resource and environment management and planning at the national level; and (4) to train individuals from developing countries in remote sensing technology. The activities of GRID are coordinated at the GEM center at Nairobi (Kenya). I.S.

A91-14997#

INTELLIGENT INFORMATION SYSTEMS AND INTERDISCIPLINARY USER ACCESS

RICHARD S. CARNAHAN, JR. (Martin Marietta Information Systems Group, Denver, CO) AIAA and NASA, International Symposium on Space Information Systems, 2nd, Pasadena, CA, Sept. 17-19, 1990. 11 p. refs (AIAA PAPER 90-5086) Copyright

An intelligent information system architecture that considers two issues, i.e., efficient interdisciplinary user access and automated information extraction and updates is presented. The system design criterion that information be continuously kept up to date without interruption of user service necessitates that an extraction process must be independent from the mechanism utilized to store and manage the resulting information. A demonstrable prototype intelligent information management system is in place and is being enhanced to include more sophisticated browse and query capabilities. Requirements analyses are progressing to better explain the levels and information types to be inferred from update messages. R.E.P.

A91-15001*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.

DISTRIBUTED PLANNING AND SCHEDULING FOR INSTRUMENT AND PLATFORM OPERATIONS

LARRY G. HULL (NASA, Goddard Space Flight Center, Greenbelt, MD), ELAINE R. HANSEN, and THOMAS P. SPARN (Colorado, University, Boulder) AIAA and NASA, International Symposium on Space Information Systems, 2nd, Pasadena, CA, Sept. 17-19, 1990. 11 p. refs (AIAA PAPER 90-5090) Copyright

Distributed planning and scheduling for instruments and platform operations in resource constrained environments are discussed. NASA has repeatedly faced the situation of multiple users having differing goals, objectives, and requirements interacting with a planning and scheduling system. Current examples include the Hubble Space Telescope and Space Station Freedom. The paper provides a brief description of the instrument and platform operations domain, discusses both traditional and distributed planning and scheduling in the context of this domain, and looks at examples of NASA environments in which planning and scheduling is or will be performed in a distributed system.

Author

A91-15523

USER ACCESS AND PRODUCTION CONTROL OF CANADA'S OPERATIONAL SAR DATA PROCESSING FACILITY

NIGEL EVANS (MacDonald Dettwiler and Associates, Ltd., Richmond, Canada) and NIGEL DENYER (Canada Centre for Remote Sensing, Ottawa) IN: Quantitative remote sensing: An

economic tool for the Nineties; Proceedings of IGARSS '89 and Canadian Symposium on Remote Sensing, 12th, Vancouver, Canada, July 10-14, 1989. Volume 1. New York, Institute of Electrical and Electronics Engineers, 1989, p. 222-225. Copyright

A91-17959

THE EVOLUTION SUPPORT ENVIRONMENT SYSTEM

C. V. RAMAMOORTHY (California, University, Berkeley), YUTAKA USUDA (Hitachi Software Engineering, Ltd., Yokohama, Japan), ATUL PRAKASH (Michigan, University, Ann Arbor), and W.-T. TSAI (Minnesota, University, Minneapolis) IEEE Transactions on Software Engineering (ISSN 0098-5589), vol. 16, Nov. 1990, p. 1225-1234. refs Copyright

The Evolution Support Environment (ESE) system, which provides a framework for capturing and making available semantic information about software components of an evolving software system, is described. The goal in the design of the ESE system was to provide integrated support for management of software architecture configuration, life-cycle configuration, and version control. Software architecture configuration management allows tracking of interconnections among software components that make up a system. Life-cycle management allows traceability among specifications, design, code, and test cases during software development. Adding version control allows specific versions of software objects and their associated objects, such as specifications and test cases, to be retrieved. The authors' experience with the use of the system is discussed. I.E.

A91-19890

TOWARD SUCCESSFUL IMPLEMENTATION OF KNOWLEDGE-BASED SYSTEMS - EXPERT SYSTEMS VS. KNOWLEDGE SHARING SYSTEMS

KIYOSHI NIWA (Hitachi, Ltd., Advanced Research Laboratory, Hatoyama, Japan) IEEE Transactions on Engineering Management (ISSN 0018-9391), vol. 37, Nov. 1990, p. 277-283. refs Copyright

Strategies are presented for successful implementation of knowledge-based systems in management fields where expertise is centralized. The crucial role of the knowledge flow from knowledge suppliers through knowledge-based systems to system users in successful implementation of knowledge-based systems is discussed. This leads to a presentation of two paradigms, namely, consulting paradigms and knowledge-sharing paradigms for knowledge-based systems, followed by identification of major implementation requirements for those two paradigms. Strategies for implementation of knowledge-based systems are then presented for expert systems that use the knowledge-sharing paradigm. I.E.

A91-26910

COMPUTER-AIDED PLANNING OF SS/TDMA NETWORK OPERATION

TAKESHI MIZUIKE, LAN N. NGUYEN (INTELSAT, Washington, DC), YASUHIKO ITO (Kokusai Denshin Denwa Co., Ltd., Research and Development Laboratories, Tokyo, Japan), and EIJIRO MAEDA (Nihon Unisys, Tokyo, Japan) IEEE Journal on Selected Areas in Communications (ISSN 0733-8716), vol. 9, Jan. 1991, p. 37-47. refs Copyright

A computer-aided approach to the planning of SS/TDMA network operation is proposed. SS/TDMA is a sophisticated satellite communication network based on an onboard switch matrix, whose operation planning is formulated as a large-scale scheduling problem. An overall planning and scheduling model is presented to deal with practical SS/TDMA systems, such as a two-frequency channel network and non-disjoint beam coverage. For systematic planning suitable for a computer-aided approach, the entire scheduling process is divided into several steps, for each of which an efficient mathematical model is proposed. A linear programming model is used for distribution of traffic on a beam-to-beam basis and the generated switching sequence is

further refined by a model using the traveling salesman problem. Burst scheduling is carried out by the Bin packing algorithm and scheduling models for practical networks allowing transponder hopping and multidestination bursts. An algorithm called enhanced rescheduling is presented to further improve the scheduling capability of the existing methods. The performance of the proposed methods is demonstrated by simulation results. I.E.

A91-29345**AN ARCHITECTURE FOR HIGH PERFORMANCE ENGINEERING INFORMATION SYSTEMS**

NICK ROUSSOPOULOS, LEO MARK, TIMOS SELLIS, and CHRISTOS FALOUTSOS (Maryland, University, College Park) IEEE Transactions on Software Engineering (ISSN 0098-5589), vol. 17, Jan. 1991, p. 22-33. University of Maryland-supported research. refs

(Contract NSF IRI-87-19458; AF-AFOSR-89-0303)

Copyright

Commercially available database systems do not meet the information and processing needs of design and manufacturing environments. A new generation of systems-engineering information systems must be built to meet these needs. The architectural and computational aspects of such systems are addressed, and solutions are proposed. The authors argue that a mainframe-workstation architecture is needed to provide distributed functionality while ensuring high availability and low communication overhead, that explicit control of metaknowledge is needed to support extensibility and evolution, that large rule bases are needed to make the knowledge of the systems active, and that incremental computation models are needed to achieve the required performance of such engineering information systems. I.E.

A91-30664* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, AL.

CONVERTING INFORMATION FROM PAPER TO OPTICAL MEDIA

TIMOTHY N. DEATON (Third Wave Technologies, Inc., Huntsville, AL) and BRUCE K. TILLER (NASA, Marshall Space Flight Center, Huntsville, AL) IN: TABES 90 - Annual Technical and Business Exhibition and Symposium, 6th, Huntsville, AL, May 15, 16, 1990, Submitted Papers. Huntsville, AL, Huntsville Association of Technical Societies, 1990, p. 135-140. refs

(TABES PAPER 90-1701) Copyright

The technology of converting large amounts of paper into electronic form is described for use in information management systems based on optical disk storage. The space savings and photographic nature of microfiche are combined in these systems with the advantages of computerized data (fast and flexible retrieval of graphics and text, simultaneous instant access for multiple users, and easy manipulation of data). It is noted that electronic imaging systems offer a unique opportunity to dramatically increase the productivity and profitability of information systems. Particular attention is given to the CALS (Computer-aided Acquisition and Logistic Support) system. O.G.

A91-30877#**THE INTEGRATED COMMUNICATION NAVIGATION IDENTIFICATION AVIONICS (ICNIA) PROGRAM SUMMARY FROM A 'LESSONS LEARNED' PERSPECTIVE**

DENISE S. JACOBS (USAF, Wright Research and Development Center, Wright-Patterson AFB, OH) IN: NAECON 90; Proceedings of the IEEE National Aerospace and Electronics Conference, Dayton, OH, May 21-25, 1990. Vol. 1. New York, Institute of Electrical and Electronics Engineers, Inc., 1990, p. 221-226.

An attempt is made to provide both technical and managerial insight into the development of advanced avionic architectures and integrated subsystems based upon the work performed under the Integrated Communication, Navigation, Identification Avionics (ICNIA) Advanced Development Model (ADM) Program. ICNIA was one of the first systems to implement an integrated, modular architecture and support built-in-test (BIT), system reconfiguration, and signal simultaneity. The following issues are addressed: (1)

identification of design problems and concerns; (2) system supportability and testability; and (3) recommended managerial tactics and control strategies. I.E.

A91-30934#**EVALUATING TOOLS AND ENVIRONMENTS CONCEPT**

KEVIN J. BERK and ROBERT P. HANRAHAN (USAF, Software Technology Support Center, Hill AFB, UT) IN: NAECON 90; Proceedings of the IEEE National Aerospace and Electronics Conference, Dayton, OH, May 21-25, 1990. Vol. 2. New York, Institute of Electrical and Electronics Engineers, Inc., 1990, p. 658-663.

The Software Technology Support Center (STSC) is the single USAF center and focal point for advocating, sustaining, and disseminating software engineering tools and environments. The STSC test and evaluation concept and specifics about the process and criteria for evaluating the tools and environments are discussed. The criteria and metrics are structured to form the software tool evaluation model (STEM) which specifies a model software engineering environment used to evaluate software engineering tools and environments. The STEM is used as a measurement device (to measure tools and environments), as an open-ended framework for evaluation criteria, as a dynamic target for tool developers to meet, and as a basis for writing tool purchase specifications. The goal of the evaluation process using STEM is to produce an unbiased tool evaluation. Users are assisted in selecting the right tools by weighting their selection criteria and elements of their applications. The weights are then applied to the evaluation results to determine which tools best meet their application and requirements. I.E.

A91-30984**DAMES PROGRAM UPDATE - METHODOLOGY, TEST RESULTS, AND IMPACT**

JAMES J. ENSELL (ZYCAD, Federal Services Group, Mount Olive, NJ) IN: NAECON 90; Proceedings of the IEEE National Aerospace and Electronics Conference, Dayton, OH, May 21-25, 1990. Vol. 3. New York, Institute of Electrical and Electronics Engineers, Inc., 1990, p. 1059-1065.

Copyright

The testing methodology that has evolved under the demonstration of avionics module exchangeability via simulation (DAMES) program, the program's accomplishments, and their impact on the DOD electronic systems procurement process are described. Test development in DAMES is defined as the process by which a comprehensive test suite is developed from an English-language specification. The DAMES specification breakdown process defines a methodology by which a complete set of requirements is extracted from a given specification. The DAMES program allows for testing and evaluation of the effectiveness of JIAWG specifications prior to fabrication. The evaluation is performed through gate-level system simulation of contractor designs using the DAMES methodology. This methodology allows for the demonstration of the effectiveness of current specifications and designs in their support of interoperability and exchangeability. I.E.

A91-30986**THE JIAWG INPUT/OUTPUT SYSTEM (JIOS)**

JOHN NEWPORT (U.S. Navy, Naval Avionics Center, Indianapolis, IN) and CHUCK ROARK (Texas Instruments, Inc., Defense Systems and Electronics Group, Plano) IN: NAECON 90; Proceedings of the IEEE National Aerospace and Electronics Conference, Dayton, OH, May 21-25, 1990. Vol. 3. New York, Institute of Electrical and Electronics Engineers, Inc., 1990, p. 1071-1076.

Copyright

The joint integrated avionics working group (JIAWG) input/output system (JIOS) provides the software/hardware interface for built-in-test (BIT) and I/O provided via the PI-Bus and TM-Bus for the JIAWG 16-bit common modules. The need for JIOS, the functionality of the JIOS, concerns related to the use of the JIOS, and a planned JIOS demonstration are presented. The JIOS is intended to be a generic software interface for BIT,

as well as PI and TM buses. The hardware and software which comprise the JIOS are required to be an integral part of the module architecture so that no operational software downloads are needed. The JIOS features are specified by the JIAWG input/output built-in-test interface definition specification (IOBIDS). IOBIDS contains a complete definition of the user interface, including functions provided, calling sequences, parameter type definitions, and special user requirements. These definitions are provided as an Ada package specification with no package body, for each functional area. I.E.

A91-31231

SYSTEM ENGINEERING MANAGEMENT

BENJAMIN S. BLANCHARD (Virginia Polytechnic Institute and State University, Blacksburg) New York, Wiley-Interscience, 1991, 406 p. refs
Copyright

The objectives and methods of systems engineering for industrial and high-technology development projects are discussed in an introductory textbook. Chapters are devoted to basic principles, the system engineering process, system design requirements, engineering design methods and tools, design review and evaluation, system engineering planning, organization for system engineering, and contracting and supplier management. Diagrams, tables, graphs, flow charts, and a glossary of terms are included, and questions and problems are provided for each chapter. T.K.

A91-35438*# National Aeronautics and Space Administration, Washington, DC.

U.S. AIR FORCE SCIENTIFIC AND TECHNICAL INFORMATION PROGRAM - THE STINFO PROGRAM

WALTER R. BLADOS (NASA, Washington, DC) Government Information Quarterly (ISSN 0740-624X), vol. 8, no. 2, 1991, p. 135-153. refs

The U.S. Air Force STINFO (Scientific and Technical Information) program has as its main goal the proper use of all available scientific and technical information in the development of programs. The organization of STINFO databases, the use of STINFO in the development and advancement of aerospace science and technology and the acquisition of superior systems at lowest cost, and the application to public and private sectors of technologies developed for military uses are examined. STINFO user training is addressed. A project for aerospace knowledge diffusion is discussed. C.D.

A91-35439#

THE AIR FORCE TECHNICAL PUBLICATIONS PROGRAM - A PERSONAL REFLECTION ON YESTERDAY, TODAY, AND TOMORROW

NANCY ALLIN (USAF, Human Resources Laboratory, Brooks AFB, TX) Government Information Quarterly (ISSN 0740-624X), vol. 8, no. 2, 1991, p. 155-165. refs

The development of the Air Force Scientific and Technical Information Program is reviewed. The management of the program is described, including planning, tracking, preparation, marking, reviewing, processing, printing, and distribution of reports. The processes involved in each of these steps are described in detail. C.D.

A91-35440#

THE WORK UNIT INFORMATION SYSTEM - A DATABASE FOR RESEARCH IN PROGRESS

LEATHA DAILEY GLISSON (USAF, Human Systems Div., Brooks AFB, TX) Government Information Quarterly (ISSN 0740-624X), vol. 8, no. 2, 1991, p. 167-174. refs

The Work Unit Information System (WUIS) is a database that facilitates the rapid exchange of technical and management data describing research, engineering, and study efforts within the DOD. The WUIS subsystems are described. Methods of searching the WUIS database are briefly addressed, and future uses of WUIS are considered. C.D.

A91-39815

COMPOSITE PROGRAMS - HIERARCHICAL CONSTRUCTION, CIRCULARITY, AND DEADLOCKS

WALEED A. MUHANNA (Ohio State University, Columbus) IEEE Transactions on Software Engineering (ISSN 0098-5589), vol. 17, April 1991, p. 320-333. refs
Copyright

A graph-oriented, nonprocedural development environment in which composite programs are constructed by coupling a collection of existing component programs, the interfaces of which are defined by a fixed number of input ports and output ports, is discussed. It is shown that when the coupling graph is cyclic there is the possibility of a deadlock. A system that permits hierarchical construction of programs while testing, using a simple algebraic procedure, the resulting composite programs for communication deadlocks is presented. A decomposition-based approach to cycle enumeration is described. A formal graph-theoretic, model of communication behavior for a class of atomic programs is presented. The model is then used to derive necessary and sufficient conditions for a deadlock to arise in a cycle. Techniques for dealing with deadly cycles (once identified) and improving the efficiency of their execution, once the cycles have been resolved, are described. I.E.

A91-40948* National Aeronautics and Space Administration, Ames Research Center, Moffett Field, CA.

STANDARDS FOR EVALUATING EXPERT SYSTEM TOOLS

SHARON S. BEACH (Beach Associates, Inc., Santa Cruz, CA) and WILLIAM GEVARTER (NASA, Ames Research Center, Moffett Field, CA) Expert Systems with Applications (ISSN 0957-4174), vol. 2, no. 4, 1991, p. 259-267. refs
Copyright

A brief survey of the literature and proposal for a standard methodology for evaluating expert system building tools are described. Criteria for expert systems environmental factors and expert systems tool features are also discussed. Author

A91-41538

GROUND SUPPORT EQUIPMENT MAINTENANCE DATA ANALYSIS

R. E. SOWDEN (RAF, England) Institution of Mechanical Engineers, Proceedings, Part G - Journal of Aerospace Engineering (ISSN 0954-4100), vol. 204, no. G2, 1990, p. 111-117.

Copyright

The Ground Support Equipment Maintenance Analysis Center (GMAC) is proposed to improve the analysis of ground support equipment (GSE) by means of computerized records and assessment. GSE is divided into two categories, standard or special-to-type, and called Major GSE or Minor GSE when requiring preventive maintenance or periodic safety checks, respectively. The GMAC data system collates and processes stored representative statistics of fleet- or type-based items, with three reporting categories for Major GSE indicating the depth of analysis required to control data output. Tables and graphs describe statistics relating to failure rates, the time to repair failures, maintenance man-hours versus time, and trends in rectification. Station management computers can provide important data for fleet-wide performance assessments and analyses related to the replacement of equipment, thereby ensuring the GSE reliability and cost reductions. C.C.S.

A91-42869

MANAGEMENT OF A LARGE SCALE DATA-PROCESSING PROJECT FOR SPACECRAFT OPERATIONS

BILL BLACK and ALISTAIR HAIRE (Marcol Group, Ltd., Space Div., Bristol, England) British Interplanetary Society, Journal (ISSN 0007-094X), vol. 44, July 1991, p. 357-363. refs

Copyright

The development of the ERS-1 Mission Management and Control Center (MMCC) software is reviewed. The three key management strategies which have contributed to the success of the ERS-1 MMCC software development include incremental implementation of the system, prototyping of many system features

prior to detailed design and implementation, and establishment of an independent test and integration team. It is concluded that the partitioning of the system functionality into a series of incremental deliveries of increasing complexity resulted in benefits to management, the development team, and the end-users. O.G.

A91-43349#

RECENT DEVELOPMENTS IN ESA'S INFORMATION AND DATA POLICY

M. DRABBE (ESA, European Space Operations Centre, Darmstadt, Federal Republic of Germany) ESA Bulletin (ISSN 0376-4265), no. 66, May 1991, p. 109-114.

Copyright

As the Agency's role developed over the last two decades, it became apparent that the detailed provisions of its original information and data policy would require a combination of modernization and expansion. A major step forward in this respect was made with the Council's approval of a new ESA document entitled 'Rules Concerning Information and Data'. Author

A91-43350#

'HYPERLINE' - THE INFORMATION BROWSER

P. G. MARCHETTI and G. MUEHLHAUSER (ESA, European Space Research Institute, Frascati, Italy) ESA Bulletin (ISSN 0376-4265), no. 66, May 1991, p. 115-118.

Copyright

State of the art information is vital to managers and engineers involved in complex projects. The already large and ever-growing volume of that information and the complexity of the computer query languages has made the accessing and retrieval process a cumbersome task. One of the natural ways in which humans acquire information is by 'browsing' - 'Hyperline' is a new information-retrieval tool that allows both 'concept' and 'reference' browsing, as well as providing the all-important semantic association between the users' concepts and those contained in the information-retrieval system itself. Author

A91-45847

RAPID PROTOTYPING OF LARGE COMMAND, CONTROL, COMMUNICATIONS AND INTELLIGENCE C3I SYSTEMS

DORIS Y. TAMANAHA and PAUL J. BOURGEOIS (Hughes Aircraft Co., Fullerton, CA) IN: 1990 IEEE Aerospace Applications Conference, Vail, CO, Feb. 4-9, 1990, Digest. New York, Institute of Electrical and Electronics Engineers, Inc., 1990, p. 253-263. refs

Copyright

Rapid prototyping is examined from three points of view: management, rapid analysis, and design. A rapid prototyping approach is presented for end-user requirements of large, data-intensive, command and control (C2); command, control, communications and intelligence (C3I); and command and control information systems (CCIS). It is noted that participatory management, highly motivated personnel, thorough knowledge of the targeted systems's operations, sound prototyping methodology, appropriate tools, and innovative techniques used by an integrated team allow for severe schedule constraints and provide the edge for fast implementation. Modified structured methods and further innovations allow a rapid prototype cycle. Experience gained and examples are cited to illustrate the ideas and methods used in successful C3I and CCIS prototypes. The authors discuss the compressed usage of known methods and introduce an innovative design method for rapid development of operational threads as an integrating design technique to quickly assemble knowledge of disparate design views and disciplines under severe prototyping schedule constraints. I.E.

A91-47757

ON EXPERIENCE IN MODELLING OF SYSTEM'S OPERATIONAL BEHAVIOUR

RAINER GERLICH (Dornier GmbH, Friedrichshafen, Federal Republic of Germany) IN: The management of large software projects in the space industry; Colloquium, Toulouse, France, Oct.

16-18, 1990, Proceedings. Toulouse, France, Cepadues-Editions, 1991, p. 79-89.

Copyright

A description is given to a software system modeling or prototyping approach, by which a very early prediction of what a system's behavior will be can be obtained. Prototyping is considered from a management point of view, with attention given to conceptualization, the implementation approach, and optimization. An implementation of operational modeling/prototyping is described which is intended to be used in the Columbus project. L.M.

A91-47762

DEVELOPMENT OF A CONFIGURABLE INFRASTRUCTURE FOR THE CONTROL OF A LARGE VARIETY OF SPACECRAFT - THE SCOS

B. MULLET (ESA, European Space Operations Centre, Darmstadt, Federal Republic of Germany) IN: The management of large software projects in the space industry; Colloquium, Toulouse, France, Oct. 16-18, 1990, Proceedings. Toulouse, France, Cepadues-Editions, 1991, p. 155-165. refs

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The paper analyzes several aspects specific to the development of infrastructure software systems and proposes several guidelines and recommendations in connection with the SCOS (Spacecraft Control and Operation System). It is pointed out that the SCOS example demonstrates that the initial cost overhead implied by the increased project complexity is largely compensated by the advantage of reusing and maintaining a single large system kernel for three or more missions. L.M.

A91-47766

THE ESA SOFTWARE ENGINEERING STANDARDS - THEIR APPLICATION TO ESA SOFTWARE PROJECTS AND THEIR EVOLUTION

C. MAZZA (ESA, European Space Operations Centre, Darmstadt, Federal Republic of Germany) IN: The management of large software projects in the space industry; Colloquium, Toulouse, France, Oct. 16-18, 1990, Proceedings. Toulouse, France, Cepadues-Editions, 1991, p. 199-203.

Copyright

The essential aspects of the ESA standards and of the foreseen modifications are outlined. The practical application of the standards to ESA software projects is examined. Consideration is given to the benefits achieved and the problems encountered inside ESA and in the industry involved in ESA projects. P.D.

A91-47769

IMPROVEMENTS NEEDED FOR SOFTWARE DEVELOPMENT IN THE LARGE

BERND KOESTERS and RAINER GERLICH (Dornier GmbH, Friedrichshafen, Federal Republic of Germany) IN: The management of large software projects in the space industry; Colloquium, Toulouse, France, Oct. 16-18, 1990, Proceedings. Toulouse, France, Cepadues-Editions, 1991, p. 227-240.

Copyright

Consideration is given to the aspects that have to be considered in managing a software project, especially a large one, namely, project management in terms of allocated manpower, costs and time schedule; management of contractors with respect to the proper determination and distribution of work packages; and software engineering aspects in terms of proper implementation, verification, and validation of the software system. Presented conditions that are necessary for keeping software development in an acceptable range include: consideration for all life-cycle phases, loose coupling of the system, availability of sufficient design resources, consideration of experience gained from previous projects, careful selection of tools, and design standardization. P.D.

A91-47772

SOFTWARE MANAGEMENT STRATEGIES AND PRACTICES FOR SPACE SYSTEMS DEVELOPMENT

LORENZO SARLO (Aeritalia S.p.A., Turin, Italy) IN: The

management of large software projects in the space industry; Colloquium, Toulouse, France, Oct. 16-18, 1990, Proceedings. Toulouse, France, Cepadues-Editions, 1991, p. 263-270. refs Copyright

Work breakdown and software industrial structures are defined and the relationships between the software and the other system disciplines are evaluated. Emphasis is placed on the experience gained from the Columbus Attached Laboratory Flight and Ground Infrastructures programs and studies. Examples of scenarios are presented for: prime software management organization; software management, development planning, and maintenance; and software versioning and incremental development/integration.

P.D.

A91-47773

STANDARDS AND S/W DEVELOPMENT ENVIRONMENTS - THE POINT OF VIEW OF A S/W ENGINEERING COMPANY INVOLVED IN SEVERAL SPACE PROGRAMS

E. ANCILLOTTO and R. BERNI (Compagnia Italiana Servizi Tecnici S.p.A., Rome, Italy) IN: The management of large software projects in the space industry; Colloquium, Toulouse, France, Oct. 16-18, 1990, Proceedings. Toulouse, France, Cepadues-Editions, 1991, p. 271-279.

Copyright

An overview is presented of an Italian company's main capabilities, which cover integrated logistic support, software engineering, and system engineering services. A systematic solution is offered for the standardization problem, with emphasis on a methodological and organizational approach to attaining a reasonable level of commonality when different projects and several customers are involved.

P.D.

A91-47774

MANAGEMENT IN SDE-BASED ORGANISATIONS

J. LANGELAND-KNUDSEN and J. GULDBERG (Computer Resources International A/S, Denmark) IN: The management of large software projects in the space industry; Colloquium, Toulouse, France, Oct. 16-18, 1990, Proceedings. Toulouse, France, Cepadues-Editions, 1991, p. 281-286.

Copyright

Several issues which are expected to be substantially influenced by the use of comprehensive engineering environments such as the Software Development Environments are addressed. They include: increased specialization in other engineering activities caused by the introduction of computer-based tools, modification of the financial structure of software engineering projects due to project planning and tool investment, and a refocussing on the software validation problem as one further consequence of increased tool support.

P.D.

A91-47776

SOFTWARE LIFECYCLE FROM AN OPERATIONS VIEWPOINT

D. TAYLOR (Space Engineering Europe, Brussels, Belgium) IN: The management of large software projects in the space industry; Colloquium, Toulouse, France, Oct. 16-18, 1990, Proceedings. Toulouse, France, Cepadues-Editions, 1991, p. 297-312.

Copyright

It is shown that the software life cycle for large space programs can be approached from an operations viewpoint, where the breakdown of software functions is related to the operations tasks required to support the mission. This leads to partitioning and prioritization of software and the concepts of reusability, where the effective management and coordination of reusability can encourage a more cost-effective and controlled approach to the complete software system.

R.E.P.

A91-47778

A REAL-TIME ADA ENVIRONMENT THAT SIMPLIFIES MANAGEMENT AND REDUCES COST

A. ROYLE, T. SKEIE, S. AHN, S. AXELRAD, and G. LANGLOIS (CAE Electronics, Ltd., Saint-Laurent, Canada) IN: The management of large software projects in the space industry;

Colloquium, Toulouse, France, Oct. 16-18, 1990, Proceedings. Toulouse, France, Cepadues-Editions, 1991, p. 325-333.

Copyright

A software environment, toolset and methodology that simplifies management and can reduce the cost of large real-time Ada software programs is presented. Consideration is given to problem areas, the structural model, the software development environment, and software configuration management.

R.E.P.

A91-47779*

National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, AL.

LESSONS LEARNED IN THE DEVELOPMENT OF THE HUBBLE SPACE TELESCOPE SOFTWARE

MICHAEL HARRINGTON (NASA, Marshall Space Flight Center, Huntsville, AL), FRANK VANLANDINGHAM (Computer Sciences Corp., Silver Spring, MD), and WILLIAM C. SCHNEIDER (Space Software Italia, Italy) IN: The management of large software projects in the space industry; Colloquium, Toulouse, France, Oct. 16-18, 1990, Proceedings. Toulouse, France, Cepadues-Editions, 1991, p. 335-343.

Copyright

An effort is made to document what was successful in the HST software development, and to present a retrospective analysis indicating what could have been done more efficiently. Consideration is given to systems engineering and design definition, standards and tools, system architecture and design, operational considerations, and reuse and adaptation of existing resources.

R.E.P.

A91-50932

MANAGING WIDE AREA NETWORKS WITH OSI NETWORK MANAGEMENT

KEDEM KAMINSKY (Aeronautical Radio, Inc., Annapolis, MD) IN: Annual International Aeronautical Telecommunications Symposium on Data Link Integration, 3rd, McLean, VA, May 20-23, 1991, Proceedings. Annapolis, MD, Aeronautical Radio, Inc., 1991, p. 41-50. refs

Copyright

An implementation of an Open Systems Interconnection (OSI) Network Management Prototype (NMP) is discussed. The project's objective is to accelerate the availability of systems that manage modern networks through the use of the OSI Network Management standards. This report describes the NMP architecture and the OSI Management concepts mastered and proven in the process. It finds that it is feasible to retrofit a subset of OSI Management onto the ADNS I environment, and that OSI Management will be even more applicable to ADNS II. The NMP research project demonstrates the feasibility of implementing the fault management aspects of OSI Network Management standards within the ARINC environment by integrating the NMP into the ADNS I wide area network. The successful completion of the prototype enables the transfer of ADNS alarm data to the NMP.

Author

A91-52427*# Hughes Aircraft Co., El Segundo, CA.

DEVELOPMENT OF TECHNOLOGY NEEDS FOR THE SEI TNIM NETWORK

M. R. WACHS (Hughes Aircraft Co., El Segundo, CA) and J. E. ZUZUK (NASA, Lewis Research Center, Cleveland, OH) AIAA, NASA, and OAI, Conference on Advanced SEI Technologies, Cleveland, OH, Sept. 4-6, 1991, 10 p. (AIAA PAPER 91-3536) Copyright

A comparison of the salient features of the SEI with previous space exploration programs shows the need for a telecommunications, navigation and information management (TNIM) system level reoptimization. An approach is developed that takes the various candidate mission plans and decomposes them into architectural building blocks, many of which are common to several of the plans. Once identified, each of these blocks can then be parametrically examined with respect to performance benefit, cost, technology, and schedule risk tradeoffs. As the Space Exploration Initiative plan is established, these TNIM building blocks may be fused into an optimized system architecture.

R.E.P.

A91-54022#

**AIRCRAFT CONFIGURATION DESIGN CODE
PROOF-OF-CONCEPT - DESIGN OF THE CREWSTATION
SUBSYSTEM**

DANIEL I. NEWMAN (Boeing Co., Helicopters Div., Philadelphia, PA) and KAYDON STANZIONE (Praxis Technologies Corp., Woodbury, NJ) AIAA, AHS, and ASEE, Aircraft Design Systems and Operations Meeting, Baltimore, MD, Sept. 23-25, 1991. 15 p. refs

(AIAA PAPER 91-3097) Copyright

Research into the application of knowledge-based software to air vehicle system design is reported. The aircraft configuration design code is a software package to independently generate a preliminary configuration layout and loft based upon air vehicle mission role and other top-level parameters. The system architecture, design methodology, and operational crewstation design routine are described. A time and resource analysis of a typical initial design study shows a substantial decrease in project duration with the introduction of an automated design capability.

R.E.P.

A91-54654

**TAILORING CONFIGURATION MANAGEMENT TOOLS FOR
DEVELOPMENT OF AVIONICS SOFTWARE**

JOHN UCZEKAJ and BANNI HUGHES (Honeywell, Inc., Commercial Flight Systems Group, Phoenix, AZ) IN: IEEE/AIAA/NASA Digital Avionics Systems Conference, 9th, Virginia Beach, VA, Oct. 15-18, 1990, Proceedings. New York, Institute of Electrical and Electronics Engineers, Inc., 1990, p. 493-498.

Copyright

The automated configuration management system (ACM), a library system for software development and maintenance on VAX/VMS systems, is described. ACM maintains its library of information through the basic file management services of VMS and through two purchased DEC tools: a relational database (DEC Rdb/VMS) and a code management system (DEC/CMS). ACM stores, controls access to, and tracks changes to project files in order to coordinate software development and maintenance activities for large projects. The automated documentation system is considered, and future extensions to ACM are discussed. The use of ACM is then examined, with attention given to traceability testing and change tracking.

I.E.

N91-10961*# National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.

INFORMATION MANAGEMENT

WENDELL RICKS and KEVIN CORKER (BBN Systems and Technologies Corp., Cambridge, MA.) In *its Aviation Safety/Automation Program Conference* p 275-288 Oct. 1990
Avail: NTIS HC/MF A12 CSCL 01C

Primary Flight Display (PFD) information management and cockpit display of information management research is presented in viewgraph form. The information management problem in the cockpit, information management burdens, the key characteristics of an information manager, the interface management system handling the flow of information and the dialogs between the system and the pilot, and overall system architecture are covered.

Author

N91-11389*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.

**PROCEEDINGS OF THE FIRST NASA ADA USERS'
SYMPOSIUM**

Dec. 1988 227 p Symposium held in Greenbelt, MD, 1 Dec. 1988

(NASA-TM-102941; SEL-88-005; NAS 1.15:102941) Avail: NTIS HC/MF A11 CSCL 09B

Ada has the potential to be a part of the most significant change in software engineering technology within NASA in the last twenty years. Thus, it is particularly important that all NASA centers be aware of Ada experience and plans at other centers. Ada activity across NASA are covered, with presenters representing

five of the nine major NASA centers and the Space Station Freedom Program Office. Projects discussed included - Space Station Freedom Program Office: the implications of Ada on training, reuse, management and the software support environment; Johnson Space Center (JSC): early experience with the use of Ada, software engineering and Ada training and the evaluation of Ada compilers; Marshall Space Flight Center (MSFC): university research with Ada and the application of Ada to Space Station Freedom, the Orbital Maneuvering Vehicle, the Aero-Assist Flight Experiment and the Secure Shuttle Data System; Lewis Research Center (LeRC): the evolution of Ada software to support the Space Station Power Management and Distribution System; Jet Propulsion Laboratory (JPL): the creation of a centralized Ada development laboratory and current applications of Ada including the Real-time Weather Processor for the FAA; and Goddard Space Flight Center (GSFC): experiences with Ada in the Flight Dynamics Division and the Extreme Ultraviolet Explorer (EUVE) project and the implications of GSFC experience for Ada use in NASA. Despite the diversity of the presentations, several common themes emerged from the program: Methodology - NASA experience in general indicates that the effective use of Ada requires modern software engineering methodologies; Training - It is the software engineering principles and methods that surround Ada, rather than Ada itself, which requires the major training effort; Reuse - Due to training and transition costs, the use of Ada may initially actually decrease productivity, as was clearly found at GSFC; and real-time work at LeRC, JPL and GSFC shows that it is possible to use Ada for real-time applications.

Author

N91-11390*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.

**ADA AND SOFTWARE MANAGEMENT IN NASA:
SYMPOSIUM/FORUM**

Jun. 1989 182 p Symposium held in Greenbelt, MD, 31 May - 1 Jun. 1989

(NASA-TM-103297; NAS 1.15:103297) Avail: NTIS HC/MF A09 CSCL 09B

The promises of Ada to improve software productivity and quality, and the claims that a transition to Ada would require significant changes in NASA's training programs and ways of doing business were investigated. The study assesses the agency's ongoing and planned Ada activities. A series of industry representatives (Computer Sciences Corporation, General Electric Aerospace, McDonnell Douglas Space Systems Company, TRW, Lockheed, and Boeing) reviewed the recommendations and assessed their impact from the Company's perspective. The potential effects on NASA programs were then discussed. B.G.

N91-13078# Naval Underwater Systems Center, Newport, RI.

**AFTER-ACTION REPORT FOR THE NEXT-GENERATION
COMPUTER RESOURCES (NGCR) OPERATING SYSTEMS
INTERFACE STANDARD BASELINE SELECTION PROCESS
Final Report**

J. T. OBLINGER, comp. 1 Jun. 1990 29 p Sponsored by Space and Naval Warfare Systems Command, Washington, DC (AD-A225833; NUSC-TD-6904) Avail: NTIS HC/MF A03 CSCL 12/7

The Next-Generation Computer Resources (NGR) Operating Systems Standards Working Group (OSSWG) conducted a survey of existing operating systems and operating systems interface standards to establish a baseline for the NGCR operating system interface (OSIF). The first section of this report describes the purpose and scope of this study, which covered the timeframe from March 1989 (a briefing made to industry) to April 1990 (when the OSIF baseline was selected). The second section discusses issues regarding the OSSWG evaluation process. Issues presented include the benefits OSSWG gained by active industry participation, the effectiveness of the electronic mail system for providing communications between meetings, the concerns about the compressed schedule, and a discussion about the difficulty in interpreting the evaluation scores. The third section addresses the technical issues that caused difficulties for OSSWG in achieving its objectives. Some of these include (1) how to define distributed

technology within an operating system interface; (2) how to specify security; (3) how security impacts the technology of real-time capabilities, distribution, and fault-tolerance; and (4) to what extent OSIF issues impact the performance of OS implementations. The technology topics in this section are presented as technology shortfall areas where there is need for additional research. GRA

N91-13090*# GHG Corp., Houston, TX.

ADANET DYNAMIC SOFTWARE INVENTORY (DSI) PROTOTYPE COMPONENT ACQUISITION PLAN

LIONEL HANLEY May 1989 19 p Revised Prepared for Houston Univ., Clear Lake, TX
(Contract NCC9-16)
(NASA-CR-187309; NAS 1.26:187309) Avail: NTIS HC/MF A03 CSCL 09/2

A component acquisition plan contains the information needed to evaluate, select, and acquire software and hardware components necessary for successful completion of the AdaNET Dynamic Software Inventory (DSI) Management System Prototype. This plan will evolve and be applicable to all phases of the DSI prototype development. Resources, budgets, schedules, and organizations related to component acquisition activities are provided. A purpose and description of a software or hardware component which is to be acquired are presented. Since this is a plan for acquisition of all components, this section is not applicable. The procurement activities and events conducted by the acquirer are described and who is responsible is identified, where the activity will be performed, and when the activities will occur for each planned procurement. Acquisition requirements describe the specific requirements and standards to be followed during component acquisition. The activities which will take place during component acquisition are described. A list of abbreviations and acronyms, and a glossary are contained.

Author

N91-13094*# Research Inst. for Advanced Computer Science, Moffett Field, CA.

PC TOOLS FOR PROJECT MANAGEMENT: PROGRAMS AND THE STATE-OF-THE-PRACTICE

PETER C. BISHOP, GLENN B. FREEDMAN, CHRISTOPHER J. DEDE, WILLIAM LIDWELL, and DAVID LEARNED Aug. 1990 116 p
(Contract NCC9-16)
(NASA-CR-187392; NAS 1.26:187392) Avail: NTIS HC/MF A06 CSCL 09/2

The use of microcomputer tools for NASA project management; which features are the most useful; the impact of these tools on job performance and individual style; and the prospects for new features in project management tools and related tools are addressed. High, mid, and low end PM tools are examined. The pro's and con's of the tools are assessed relative to various tasks. The strengths and weaknesses of the tools are presented through cases and demonstrations.

B.G.

N91-13147*# Research Inst. for Advanced Computer Science, Moffett Field, CA.

ADANET RESEARCH PLAN

JOHN G. MCBRIDE (Softtech, Inc., Houston, TX.) 1 May 1990 66 p
(Contract NCC9-16)
(NASA-CR-187262; NAS 1.26:187262) Avail: NTIS HC/MF A04 CSCL 09/2

The mission of the AdaNET research effort is to determine how to increase the availability of reusable Ada components and associated software engineering technology to both private and Federal sectors. The effort is structured to define the requirements for transfer of Federally developed software technology, study feasible approaches to meeting the requirements, and to gain experience in applying various technologies and practices. The overall approach to the development of the AdaNET System Specification is presented. A work breakdown structure is presented with each research activity described in detail. The deliverables for each work area are summarized. The overall organization and responsibilities for each research area are described. The schedule

and necessary resources are presented for each research activity. The estimated cost is summarized for each activity. The project plan is fully described in the Super Project Expert data file contained on the floppy disk attached to the back cover of this plan.

Author

N91-13362*# Research Inst. for Advanced Computer Science, Moffett Field, CA.

THE JOHNSON SPACE CENTER MANAGEMENT INFORMATION SYSTEMS (JSCMIS): AN INTERFACE FOR ORGANIZATIONAL DATABASES

PETER C. BISHOP and LLOYD ERICKSON (National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.) Feb. 1990 54 p
(Contract NCC9-16)
(NASA-CR-187256; NAS 1.26:187256) Avail: NTIS HC/MF A04 CSCL 05/2

The Management Information and Decision Support Environment (MIDSE) is a research activity to build and test a prototype of a generic human interface on the Johnson Space Center (JSC) Information Network (CIN). The existing interfaces were developed specifically to support operations rather than the type of data which management could use. The diversity of the many interfaces and their relative difficulty discouraged occasional users from attempting to use them for their purposes. The MIDSE activity approached this problem by designing and building an interface to one JSC data base - the personnel statistics tables of the NASA Personnel and Payroll System (NPPS). The interface was designed against the following requirements: generic (use with any relational NOMAD data base); easy to learn (intuitive operations for new users); easy to use (efficient operations for experienced users); self-documenting (help facility which informs users about the data base structure as well as the operation of the interface); and low maintenance (easy configuration to new applications). A prototype interface entitled the JSC Management Information Systems (JSCMIS) was produced. It resides on CIN/PROFS and is available to JSC management who request it. The interface has passed management review and is ready for early use. Three kinds of data are now available: personnel statistics, personnel register, and plan/actual cost.

Author

N91-13363*# Research Inst. for Advanced Computer Science, Moffett Field, CA.

FACTORS SHAPING THE EVOLUTION OF ELECTRONIC DOCUMENTATION SYSTEMS

CHRISTOPHER J. DEDE, TIM R. SULLIVAN, and JACQUE R. SCACE 1990 128 p
(Contract NCC9-16)
(NASA-CR-187257; NAS 1.26:187257) Avail: NTIS HC/MF A07 CSCL 05/2

The main goal is to prepare the space station technical and managerial structure for likely changes in the creation, capture, transfer, and utilization of knowledge. By anticipating advances, the design of Space Station Project (SSP) information systems can be tailored to facilitate a progression of increasingly sophisticated strategies as the space station evolves. Future generations of advanced information systems will use increases in power to deliver environmentally meaningful, contextually targeted, interconnected data (knowledge). The concept of a Knowledge Base Management System is emerging when the problem is focused on how information systems can perform such a conversion of raw data. Such a system would include traditional management functions for large space databases. Added artificial intelligence features might encompass co-existing knowledge representation schemes; effective control structures for deductive, plausible, and inductive reasoning; means for knowledge acquisition, refinement, and validation; explanation facilities; and dynamic human intervention. The major areas covered include: alternative knowledge representation approaches; advanced user interface capabilities; computer-supported cooperative work; the evolution of information system hardware; standardization, compatibility, and connectivity; and organizational impacts of information intensive environments.

Author

N91-13926 National Physical Lab., Teddington (England). Div. of Electrical Science.

SOFTWARE MANAGEMENT GUIDELINES FOR AUTOMATED MEASURING SYSTEMS

E. J. GRIFFIN, D. J. BANNISTER, D. W. BRADSTREET, R. N. CLARKE, M. G. COX, L. GRAVER, T. E. HODGETTS, J. P. IDE, J. LUFF, G. R. ORFORD et al. Jul. 1990 13 p
(NPL-DES-99; ISSN-0143-7305; ETN-91-98370) Copyright
Avail: National Physical Laboratory, Teddington, TW11 0LW, England

Guidance is given for writing and controlling the use of computer programs and processing data for automated measuring systems. ESA

N91-13940# Naval Postgraduate School, Monterey, CA. Dept. of Computer Science.

FLEXIBLE COOPERATION IN NON-STANDARD APPLICATION ENVIRONMENTS Progress Report, Apr. - Dec. 1989

BERNHARD HOLTkamp (Dortmund Univ., Germany, F.R.) Jan. 1990 27 p
(AD-A226486; NPS52-90-018) Avail: NTIS HC/MF A03 CSCL 12/7

The integration of preexisting systems into a single, heterogeneous, distributed non-standard application system in domains like office automation or computer-integrated manufacturing are regarded as cooperating systems. They are characterized through teamwork, distribution and the handling of complex data structures (e.g., multimedia data). Object-oriented database systems, providing for complex object management, represent one approach in support of such applications. They concentrate, however, on data modeling aspects and use more or less conventional transaction concepts, based on a global execution control. Hence, they only partially fulfill application requirements as they do not adequately cope with the autonomy that is often inherent to the system's components. As a consequence, we suggest S-transactions as an appropriate means for describing the cooperation of system components in terms of transactions and beyond. In this paper we outline the modeling of conventional transactions (flat or nested as well as distributed and design transactions) in terms of STDL, the S-transaction definition language. Beyond that we point out how to specify SAGAs and similar concepts. Finally we discuss the specification of non-linear but maybe acyclic or even cyclic cooperation structures. GRA

N91-14082# Oak Ridge National Lab., TN. Metals and Ceramics Div.

REPORT OF FOREIGN TRAVEL

RICHARD A. STREHLOW 19 Oct. 1990 10 p
(Contract DE-AC05-84OR-21400)
(DE91-001732; ORNL/FTR-3800) Avail: NTIS HC/MF A02

Terminological requirements in information management was but one of the principal themes of the 2nd Congress on Terminology and Knowledge Engineering. The traveler represented the American Society for Testing and Materials' Committee on Terminology, of which he is the Chair. The traveler's invited workshop emphasized terminology standardization requirements in databases of material properties as well as practical terminology standardizing methods. The congress included six workshops in addition to approximately 82 lectures and papers from terminologists, artificial intelligence practitioners, and subject specialists from 18 countries. There were approximately 292 registrants from 33 countries who participated in the congress. The congress topics were broad. Examples were the increasing use of International Standards Organization (ISO) Standards in legislated systems such as the USSR Automated Data Bank of Standardized Terminology, the enhanced Physics Training Program based on terminology standardization in Physics in the Chinese province of Inner Mongolia, and the technical concept dictionary being developed at the Japan Electronic Dictionary Research Institute, which is considered to be the key to advanced artificial intelligence applications. The more usual roles of terminology work in the areas of machine translation, indexing

protocols, knowledge theory, and data transfer in several subject specialties were also addressed, along with numerous special language terminology areas. DOE

N91-14757# Maryland Univ., College Park. Inst. for Advanced Computer Studies.

A SOFTWARE-SYSTEM VISUALIZATION TOOL

JOHN R. CALLAHAN and JAMES M. PURTILO Apr. 1990 20 p
(AD-A227145; UMIACS-TR-90-51; CS-TR-2450) Avail: NTIS HC/MF A03 CSCL 12/5

Minion is a visual link editor used to configure and instrument software systems. It was originally developed as a general purpose graph editor for use in many task domains where connected graphs appropriately model logical structures. A software system, for example, can be represented by a connected graph - nodes and edges of the graph correspond respectively to large-grain software modulus (e.g. programs, files, databased, servers) and the dependencies established between these modules (e.g. procedure calls, message passing channels). We use the tool to write, visualize, and execute specifications for heterogeneous, distributed software applications in the Polyolith module interconnection environment. Our tool complements use of the Polyolith textual module interconnection environment. Our tool complements use of the Polyolith textual module interconnection language (MIL) because Minion is used as a link editor that reads and writes MIL specifications. Through the use of windows, icons, menus, and other means of direct manipulation, users can edit MIL specs as graphs in order to perform complex configuration management tasks which may be tedious to denote directly in the MIL. GRA

N91-14762# Carnegie-Mellon Univ., Pittsburgh, PA. Software Engineering Inst.

THE ROLE OF ASSESSMENT IN SOFTWARE PROCESS IMPROVEMENT Final Report

DAVID H. KITSON and WATTS S. HUMPHREY Dec. 1989 48 p
(Contract F19628-85-C-0003)
(AD-A227426; CMU/SEI-89-TR-3; ESD-TR-89-3) Avail: NTIS HC/MF A03 CSCL 12/5

The role is discussed of assessment in improving an organization's software capabilities; specifically, the ability of the organization's projects to consistently meet cost, schedule, and quality objectives. Software process assessments are described from both a conceptual and pragmatic point of view. Underlying concepts of software process, software process management, and software process maturity are discussed. Collectively, these constitute a framework for software process assessment and improvement. GRA

N91-14892*# National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.

THE NASA/DOD AEROSPACE KNOWLEDGE DIFFUSION RESEARCH PROJECT: A RESEARCH AGENDA

THOMAS E. PINELLI and JOHN M. KENNEDY 1990 13 p
(NASA-TM-103439; NAS 1.15:103439; AD-A226502; SAF/AQT-SR-90-011; USAF-STINFO-CONTRIB-90/6) Avail: NTIS HC/MF A03 CSCL 05/2

The project has both immediate and long term purposes. In the first instance it provides a practical and pragmatic basis for understanding how the results of NASA/DoD research diffuse into the aerospace R and D process. Over the long term it provides an empirical basis for understanding the aerospace knowledge diffusion process itself, and its implications at the individual, organizational, national, and international levels. The project is studying the major barriers to effective knowledge diffusion. This project will provide descriptive and analytical data regarding the flow of scientific and technical information (STI). It will examine both channels used to communicate information and the social system of the aerospace knowledge diffusion process. GRA

05. COMPUTERS AND INFORMATION MANAGEMENT

N91-15773*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.

MANAGER'S HANDBOOK FOR SOFTWARE DEVELOPMENT, REVISION 1

Nov. 1990 90 p Revised
(NASA-TM-103417; NAS 1.15:103417; SEL-84-101-REV-1)
Avail: NTIS HC/MF A05 CSCL 09/2

Methods and aids for the management of software development projects are presented. The recommendations are based on analyses and experiences of the Software Engineering Laboratory (SEL) with flight dynamics software development. The management aspects of the following subjects are described: organizing the project, producing a development plan, estimating costs, scheduling, staffing, preparing deliverable documents, using management tools, monitoring the project, conducting reviews, auditing, testing, and certifying. Author

N91-16585# Carnegie-Mellon Univ., Pittsburgh, PA. Software Engineering Inst.

UNDERSTANDING THE ADOPTION OF ADA: RESULTS OF AN INDUSTRY SURVEY

MARTHENA CARLSON and GORDON N. SMITH May 1990 62 p
(Contract F19628-85-C-0003)
(AD-A226725; CMU/SEI-90-SR-10) Avail: NTIS HC/MF A04 CSCL 12/5

In 1983, the U.S. Department of Defense (DoD) established a policy requiring the use of a new programming language, Ada, for the development of all new Mission-Critical Computer Resource (MCCR) software that it purchases. Firms that supply the DoD with these systems have shown considerable variation in their decisions to incorporate this new technology into their products and production processes. This survey is part of a multi-stage research project that sought to understand the variability in firms' adoption and use of new information technologies. Herein is a follow-up and elaboration on a case study of the adoption of Ada which is described in CMU/SEI-89-TR-28, Understanding the Adoption of Ada: A Field Study Report. Participants in the survey were 123 business and technical people from 69 business units that supply the DoD with the MCCR software systems and services. The survey explored factors pertaining to respondents' technical and market environments in an attempt to describe depth of adoption and to describe the differences between the firms with active Ada contracts and those without the active contracts. For firms that have adopted Ada, aspects are described of the language and tools that are considered most useful in different application areas. GRA

N91-16619# IBM Federal Systems Div., Gaithersburg, MD.
DTD CREATION FOR THE SOFTWARE TECHNOLOGY FOR ADAPTABLE, RELIABLE SYSTEMS (STARS) PROGRAM Final Technical Report

S. KUTOROFF 23 Jun. 1990 18 p
(Contract F19628-88-D-0032)
(AD-A228475; CDRL-1810) Avail: NTIS HC/MF A03 CSCL 12/5

Within the Software Technology for Adaptable Reliable Systems (STARS) there exists a need to exchange source code and documents between the prime contractors. Even within this program there are multiple hardware vendors, operating systems, and applications software. The problems experienced by the DoD in exchanging reusable documents are apparent within STARS. Part of the problem was addressed by the selection of the Standard Generalized Markup Language as the standard for document exchange. SGML defines a standard means to specify the organization and relationships between the elements of structured documents. SGML is intended to be used in the preparation of documents using descriptive markup to denote document elements. The Document Type Definition (DTD) defines the elements of a document and specifies the relationship of each element to other elements. The section on the history of electronic document production explains some of the reasons why descriptive markup is important and why SGML is the appropriate tool for use in the

STARS program for document interchange. The DTDs as used in the STARS program as well as those used in other DoD programs are introduced. The features and rationale for the DTDs are discussed and the foundation for a STARS DTD is presented.

GRA

N91-16839# Air Force Inst. of Tech., Wright-Patterson AFB, OH.

MANAGING EMERGING TECHNOLOGY: CASE STUDIES IN DOCUMENT IMAGING SYSTEMS M.S. Thesis

RICHARD K. BROWN 1990 152 p
(AD-A227688; AFIT/CI/CIA-90-068) Avail: NTIS HC/MF A08 CSCL 14/5

A document imaging system (DIS) digitizes paper-based information, such as graphics and text, into images for storage, maintenance and retrieval. This technology promises and, in many cases of actual DIS implementation, has delivered many benefits to organizations. Document imaging technology is enabling organizations to handle their information more efficiently than in the past. However, organizations face many issues while implementing this technology. Six case studies of organizations which appraised Document Imaging Systems (DIS) are presented and detailed. The research had two thrusts. The first aimed to identify critical management issues relating to the successful assimilation of DIS. Actions identified included ensuring integration into the existing technical architecture, designing adequate image distribution channels, preparing for future technology changes, choosing the right applications to implement, selecting appropriate indexes, overhauling the work process, alleviating the concerns of the users, securing adequate management support, and justifying the technology. The second goal sought to examine how organizations implementing document imaging technology progress through six stages of technology assimilation: Awareness/Observation, Evaluation/Justification, Acquisition/Installation/Modification, Pilot Test/Experiment, Limited Production, and Full Production. GRA

N91-17583*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.

DATABASE ACCESS MANAGER FOR THE SOFTWARE ENGINEERING LABORATORY (DAMSEL) USER'S GUIDE

Mar. 1990 334 p
(NASA-TM-103392; SEL-90-001; NAS 1.15:103392) Avail: NTIS HC/MF A15 CSCL 09/2

Operating instructions for the Database Access Manager for the Software Engineering Laboratory (DAMSEL) system are presented. Step-by-step instructions for performing various data entry and report generation activities are included. Sample sessions showing the user interface display screens are also included. Instructions for generating reports are accompanied by sample outputs for each of the reports. The document groups the available software functions by the classes of users that may access them. Author

N91-17597# IBM Federal Systems Center, Gaithersburg, MD.
STARS STRUCTURE (DOD AAS IOM DOCUMENT VERSION 1.3) FOR THE SOFTWARE TECHNOLOGY FOR ADAPTABLE, RELIABLE SYSTEMS (STARS) PROGRAM Final Report

WILLIAM H. ETT 11 May 1990 284 p
(Contract F19628-88-D-0032)
(AD-A228479) Avail: NTIS HC/MF A13 CSCL 12/7

Information Object Modeling is a technique for developing specification models for systems. The techniques for building Information Object Models were adapted from techniques of real-time structured analysis and the Foxboro company's experience in specifying and developing real-time process control systems. An information object Model (IOM) is organized to provide levels of information for different audiences, so that one document can meet the needs of different people. A mission statement is provided which describes the scope of the system. An overview of the system describes the major functional objects. Finally, each functional object is discussed in detail. The modeling techniques for an IOM use the graphical techniques real-time structured

analysis, including transformation diagrams (data flow plus control flow), state transition diagrams, and entity relationship diagrams. Transformation diagrams, however, are applied in a different manner, representing the communication of objects organized hierarchically rather than a functional decomposition of processes. This document describes a specification model for an air traffic control system prepared using Real Time Structured Analysis. It shows Foxboro's concept of specification packaging and can serve as an alternative to MIL-STD-2167A. GRA

N91-17820 United States-Japan Task Force on Scientific and Technical Information.

US-JAPAN TASK FORCE ON SCIENTIFIC AND TECHNICAL INFORMATION

1990 25 p
(PB90-237561) Copyright Avail: Issuing Activity CSCL 05/2

Progress made at the joint meeting of the U.S.-Japan Task Force on Scientific and Technical Information is discussed. The meetings were guided in their agendas by the following objectives: (1) improve the awareness and understanding of organizations and systems established to improve the use of scientific and technical information; (2) increase the quantity and quality of scientific and technical information; (3) reduce impediments, if any, to the flow of scientific and technical information; and (4) increase the translation of scientific and technical information. Y.S.

N91-17825# National Inst. of Standards and Technology, Gaithersburg, MD.

AUTOMATED INFORMATION SYSTEM SECURITY ACCREDITATION GUIDELINES

Aug. 1990 49 p Sponsored by FAA, Washington, DC
(PB90-264102; NISTIR-4378) Avail: NTIS HC/MF A03 CSCL 05/2

This Federal Aviation Administration's publication provides procedures for the preparation of documentation required for security accreditation of automated information systems. It was designed to make the accreditation process as straightforward as possible for any system, whatever its purpose or level of complexity. The accreditation process requires the identification of the data processing activities in the data processing installation and the completion of the forms in this guideline to develop a security profile of the system, conduct a risk assessment, and document contingency plans. A designated approving authority then signs the accreditation statements that formally accept the risks to each data processing activity. GRA

N91-17828# Transportation Research Board, Washington, DC.
GEOGRAPHIC INFORMATION SYSTEMS, 1990

N. C. KASSABIAN, A. G. TOBIAS, L. CARYTON, K. SOLOMON, and N. SOLOMON 1990 77 p
(PB91-108423; TRB/TRR-1261; ISBN-0-309-05015-4; LC-90-13240; ISSN-0361-1981) Avail: NTIS HC/MF A05 CSCL 05/2

The following subject areas are covered: potential for geographic information systems (GIS) in transportation planning and highway infrastructure management; using GIS technology to enhance the pavement management process; pavement management applications of GIS; automated conversion of milepoint data to intersection/link network structure; an application of GIS in transportation; use of GIS in managing hazardous materials shipments; hydrologic GIS; evaluation of GIS workstation performance within a distributed network environment; and emergent roles for optical media in transport engineering. Author

N91-18617*# National Aeronautics and Space Administration, Lyndon B. Johnson Space Center, Houston, TX.

THE RICIS CONCEPT

ROBERT B. MACDONALD *In* Houston Univ., RICIS 1987 Symposium. Executive Summary 35 p 1987
Avail: NTIS HC/MF A15 CSCL 09/2

A cooperative program was initiated by JSC with the University of Houston - Clear Lake to support research in computing and information systems. The objective of this program is to provide

continuing long-term research in support of the numerous mission and mission-related endeavors of NASA/JSC. The Research Institute for Computing and Information Systems (RICIS) concept is presented in form of viewgraphs. History of RICIS, its organization, and research status are discussed. Y.S.

N91-18620*# Houston Univ., Clear Lake, TX. Space Business Information Center.

AN OVERVIEW OF THE INFORMATION MANAGEMENT COMPONENT OF RICIS Abstract Only

PETER C. BISHOP *In* its RICIS 1987 Symposium. Executive Summary 2 p 1987

Avail: NTIS HC/MF A15 CSCL 12/1

Information management is the RICIS (Research Institute for Computing and Information Systems) research area which covers four types of tasks initiated during the first year of research: (1) surveys - a description of the existing state of some area in computing and information systems; (2) forecasts - a description of the alternative future states of some area; (3) plans - an approach to accomplishing some objective in the future; and (4) demonstrations - working prototypes and field trials to study the feasibility and the benefits of a particular information system. The activity in these research areas is described. Y.S.

N91-18750# Technische Univ., Delft (Netherlands). Faculty of Technical Mathematics and Informatics.

THEORETICAL CONSIDERATIONS ON ERROR MANAGEMENT

JURGEN STIGTER 1990 52 p Sponsored by Netherlands National SPIN/FLAIR
(REPT-90-75; ISSN-0922-5641; ETN-91-98752) Copyright
Avail: NTIS HC/MF A04

A definition of system reliability and failure of a system is presented. Erroneous states, errors and faults are discussed. Reliability requirements and types of faults are reviewed. Techniques for error management: error detection, damage assessment and confinement, error recovery, error diagnosis, fault treatment and continued reliable service, fault error documentation, and fault/error analysis (learning) and maintenance are described. An illustration of the theoretical considerations, an example of a system, and the problems in designing and operating it are given. Starting with a problem description, a system is designed and built (on paper). Error management considerations, and the difficulties of specifying a system are demonstrated. Problems of specification in relation to error management are discussed. ESA

N91-18905# Oak Ridge National Lab., TN.

ESTABLISHING FUNCTIONAL REQUIREMENTS FOR EMERGENCY MANAGEMENT INFORMATION SYSTEMS

J. H. REED, G. O. ROGERS, and J. H. SORENSEN 1991 9 p
Presented at the Society for Computer Simulation Western Multiconference, Anaheim, 23-25 Jan. 1991

(Contract DE-AC05-84OR-21400)
(DE91-006340; CONF-910128-3) Avail: NTIS HC/MF A02

The advancement of computer technologies has led to the development of a number of emergency management information systems (e.g., EIS, CAMEO, IEMIS). The design of these systems has tended to be technologically driven rather than oriented to meeting information management needs during an emergency. Of course, emergency management needs vary depending on the characteristics of the emergency. For example, in hurricanes, onset is typically slow enough to allow emergency managers to simulate evacuations dynamically while in chemical disasters onset may be sufficiently rapid to preclude such simulation(s). This paper describes a system design process in which the analysis of widely recognized emergency management functions was used to identify information requirements and the requisite software and hardware capabilities to deal with rapid onset, low probability, high consequence events. These requirements were then implemented as a prototype emergency management system using existing hardware and software to assure feasibility. Data, hardware, and software requirements were further developed, refined, and made more concrete through an iterative prototyping effort. This approach

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focuses attention directly on meeting emergency management information needs while avoiding unneeded technological innovations. DOE

N91-18976*# Alabama Univ., Huntsville. Dept. of Computer Science.

NATIONAL LAUNCH STRATEGY VEHICLE DATA MANAGEMENT SYSTEM

DAVID CORDES In Alabama Univ., Research Reports: 1990 NASA/ASEE Summer Faculty Fellowship program 5 p Oct. 1990

(Contract NGT-01-002-099)

Avail: NTIS HC/MF A16 CSCL 22/2

The national launch strategy vehicle data management system (NLS/VDMS) was developed as part of the 1990 NASA Summer Faculty Fellowship Program. The system was developed under the guidance of the Engineering Systems Branch of the Information Systems Office, and is intended for use within the Program Development Branch PD34. The NLS/VDMS is an on-line database system that permits the tracking of various launch vehicle configurations within the program development office. The system is designed to permit the definition of new launch vehicles, as well as the ability to display and edit existing launch vehicles. Vehicles can be grouped in logical architectures within the system. Reports generated from this package include vehicle data sheets, architecture data sheets, and vehicle flight rate reports. The topics covered include: (1) system overview; (2) initial system development; (3) supercard hypermedia authoring system; (4) the ORACLE database; and (5) system evaluation. Author

N91-19026*# Massachusetts Inst. of Tech., Cambridge. Flight Transportation Lab.

THE TEMPORAL LOGIC OF THE TOWER CHIEF SYSTEM

LYMAN R. HAZELTON, JR. In NASA, Langley Research Center, Joint University Program for Air Transportation Research, 1989-1990 p 15-28 Dec. 1990

(Contract NGL-22-009-640)

Avail: NTIS HC/MF A09 CSCL 17/7

The purpose is to describe the logic used in the reasoning scheme employed in the Tower Chief system, a runway configuration management system. First, a review of classical logic is given. Defensible logics, truth maintenance, default logic, temporally dependent propositions, and resource allocation and planning are discussed. Author

N91-19119# General Accounting Office, Washington, DC.

SPACE SHUTTLE: NASA SHOULD IMPLEMENT INDEPENDENT OVERSIGHT OF SOFTWARE DEVELOPMENT

Feb. 1991 29 p

(GAO/IMTEC-91-20) Avail: NTIS HC/MF A03

In response to a request from the House Committee on Science, Space, and Technology, the General Accounting Office (GAO) presents information on NASA's efforts to improve shuttle software oversight activities and to establish independent oversight of critical shuttle software processes. GAO identifies NASA's procedures for developing, validating, verifying, and reconfiguring shuttle software. GAO also notes recommendations made by the independent contractor hired by NASA to verify and validate shuttle software; problems hindering NASA's progress in implementing the recommendations; actions taken by NASA to specifically resolve concerns raised by the National Research Council (NRC) and the shuttle program's software steering group formed to recommend changes in the verification and validation processes; and GAO's recommendations. Included as an appendix are NASA's comments on GAO's findings. J.P.S.

N91-19713# Army Research Inst. for the Behavioral and Social Sciences, Alexandria, VA.

TEST ANALYSIS PROGRAM EVALUATION: ITEM STATISTICS AS FEEDBACK TO TEST DEVELOPERS Final Report, Feb. 1989 - Mar. 1990

PETER J. LEGREE Oct. 1990 17 p

(AD-A229851; ARI-RN-91-03) Avail: NTIS HC/MF A03 CSCL 14/2

The test analysis program was evaluated to determine the feasibility of using a personal computer to provide course developers with item statistics. This project was undertaken because of Signal School concern that course tests do not accurately measure student school performance. The evaluation focused on the usefulness of providing item statistics to course test developers and demonstrated that many of the tests contain poorly written items. The evaluation indicates that a computerized test analysis program can be used to identify questionable test items and help ensure Signal School tests are adequate to validate lessons and courses. GRA

N91-19729*# National Aeronautics and Space Administration, Washington, DC.

THE ROLE OF SOFTWARE ENGINEERING IN THE SPACE STATION PROGRAM

DANA HALL In Houston Univ., RICIS 1988 Symposium Proceedings. Presentation appendix 11 p 1988

Avail: NTIS HC/MF A07 CSCL 09/2

Software engineering applications snapshots within the Space Station Freedom Program; software engineering and Ada training; software reuse; hierarchical command and control; program characteristics; integrated, international environments; software production, integration, and management; and integrated simulation environment are outlined in viewgraph format. B.G.

N91-20786*# Research Inst. for Advanced Computer Science, Moffett Field, CA.

SPACECRAFT SOFTWARE TRAINING NEEDS ASSESSMENT RESEARCH Final Report

SHIRLEY RATCLIFF and KATHARINE GOLAS (Southwest Research Inst., Houston, TX.) 27 Apr. 1990 31 p

(Contract NCC9-16)

(NASA-CR-188103; NAS 1.26:188103) Avail: NTIS HC/MF A03 CSCL 09/2

The problems were identified, along with their causes and potential solutions, that the management analysts were encountering in performing their jobs. It was concluded that sophisticated training applications would provide the most effective solution to a substantial portion of the analysts' problems. The remainder could be alleviated through the introduction of tools that could help make retrieval of the needed information from the vast and complex information resources feasible. Y.S.

N91-20787*# Research Inst. for Advanced Computer Science, Moffett Field, CA.

SPACECRAFT SOFTWARE TRAINING NEEDS ASSESSMENT RESEARCH, APPENDICES

SHIRLEY RATCLIFF and KATHARINE GOLAS (Southwest Research Inst., Houston, TX.) 27 Apr. 1990 75 p

(Contract NCC9-16)

(NASA-CR-188104; NAS 1.26:188104) Avail: NTIS HC/MF A04 CSCL 09/2

The appendices to the previously reported study are presented: statistical data from task rating worksheets; SSD references; survey forms; fourth generation language, a powerful, long-term solution to maintenance cost; task list; methodology; SwRI's instructional systems development model; relevant research; and references. Y.S.

N91-20979# Air Force Inst. of Tech., Wright-Patterson AFB, OH. School of Systems and Logistics.

A PERFORMANCE ANALYSIS OF THE USAF WORK INFORMATION MANAGEMENT SYSTEM M.S. Thesis

RENO T. LIPPOLD Sep. 1990 212 p

(AD-A229788; AFIT/GEM/LSM/90S-9) Avail: NTIS HC/MF A10 CSCL 05/2

Information was collected and analyzed which relates to system performance of the Work Information Management System (WIMS). Information on system performance analysis and tuning is consolidated by means of literature review and interviews of.

experts. A combination tutorial and questionnaire is developed to collect the data. Two new measurement techniques are developed. Data are collected and summarized on system performance knowledge and involvement in the field. Data are collected on system parameter settings and configuration, external factors related to system performance, and levels of system performance. The data are analyzed to provide a description of current performance conditions, to establish a baseline for future comparisons, and to determine or confirm relationships between performance related variables. Relationships between system performance and other variables are emphasized. Information is collected in fifteen areas of performance from forty-two bases. The research shows larger system memory and unfixed Sharer buffers are strongly related to better system performance. A list of suggested parameter settings is provided. Recommendations for future research in this area are presented. GRA

N91-21748# Argonne National Lab., IL.
AUTOMATED COMPUTER SOFTWARE DEVELOPMENT STANDARDS ENFORCEMENT

H. P. YULE and J. W. FORMENTO 1991 8 p Presented at the 4th Software Engineering Standards Application Workshop, San Diego, 21-23 May 1991
 (Contract W-31-109-ENG-38)
 (DE91-007328; CONF-9105125-1) Avail: NTIS HC/MF A02

The Uniform Development Environment (UDE) is being investigated as a means of enforcing software engineering standards. For the programmer, it provides an environment containing the tools and utilities necessary for orderly and controlled development and maintenance of code according to requirements. In addition, it provides DoD management and developer management the tools needed for all phases of software life cycle management and control, from project planning and management, to code development, configuration management, version control, and change control. This paper reports the status of UDE development and field testing. DOE

N91-21762# Army Engineer Waterways Experiment Station, Vicksburg, MS. Information Technology Lab.
SOFTWARE DEVELOPMENT STANDARDS FOR PROJECT COST MANAGEMENT INFORMATION SYSTEM Final Report
 MARGARET B. WRIGHT Dec. 1990 21 p
 (AD-A231282; WES/MP/ITL-90-6) Avail: NTIS HC/MF A03
 CSCL 12/5

The U.S. Army Engineer Waterways Experiment Station (WES) Corporate Data Base Project (CDB) is using software engineering methods and a structured approach for development of management information systems. These software engineering methods are implemented on the Project Cost Management Information System (PCMIS) as part of the WES CDB. The standards used are based not only on the structured approach but also on Department of Defense and Military standards. Modifications were made to typical life cycle standards so they apply to a fourth generation language (4GL) based information system being developed in a prototyping environment. Project standards encompass quality assurance, design analysis, development, documentation, testing, screen/report standards, and security. Configuration management (CM) standards are developed, but implementation has proven very difficult in a prototyping environment. CM implementation is planned after successful system testing. The use of standards provides consistency in reporting and is a valuable tool for the assurance of a quality product. GRA

N91-21964# Sandia National Labs., Albuquerque, NM.
ADMINISTRATIVE INFORMATION SYSTEMS PLAN, FY 1991 - FY 1995

R. J. DETRY and L. H. PITTS Jan. 1991 76 p
 (Contract DE-AC04-76DP-00789)
 (DE91-008072; SAND-90-2993) Avail: NTIS HC/MF A05

In FY90 important milestones from past Administrative Information Systems (AIS) plans were realized. The first phase of the Payroll migration was implemented early in the year. This

event signified the completion of a major migration milestone and the transition of the Laboratory Information Systems (LIS) machine to a production environment. The Access and Clearance System (A and CS) system and several early deliverables from other migration projects were also implemented during the year. FY91 promises to be another challenging year for those involved with administrative information systems. Aggressive schedules are in effect for the migration projects; the Financial Migration, Human Resources (HR) Migration, and Integrated Procurement System Replacement (IPS/R) efforts will deliver major system components this year. The administrative computing consolidation is underway and will be completed early in FY91. Consolidating computing hardware resources will provide adequate resources and better systems support for the entire AIS community. DOE

N91-22244# Messerschmitt-Boelkow-Blohm G.m.b.H., Bremen (Germany, F.R.). Space Systems Group.

COLUMBUS GENERIC ELEMENT MANAGEMENT AND PLANNING CONCEPT

J. SVED and H. LUTTMANN In ESA, Ground Data Systems for Spacecraft Control p 337-342 Oct. 1990 Previously announced as N91-12742 Prepared in cooperation with Erno Raumfahrttechnik G.m.b.H.

Copyright Avail: NTIS HC/MF A99

The status of development of the Columbus onboard autonomous control function concept known as the System and Mission Management (SMM) is outlined. The complementary execution timeline planning methodology, that uses Columbus era computer tools is described. The possibility of condensing the documentation tree for payload integration with respect to the operation planning and execution support information is discussed. The use of the Columbus generic element manager command mechanism and data structure to this end is analyzed. ESA

N91-22265*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

WORKSTATION TECHNOLOGY FOR ENGINEERING MISSION OPERATIONS AT THE JET PROPULSION LABORATORY

KEVIN J. MILLER and SUSAN C. MURPHY In ESA, Ground Data Systems for Spacecraft Control p 477-481 Oct. 1990 Sponsored by NASA, Washington
 Copyright Avail: NTIS HC/MF A99 CSCL 09/6

The Operations Engineering Laboratory (OEL) at the Jet Propulsion Laboratory has been developing graphics tools to automate document preparation in support of space flight mission operations. One such tool, which generates a daily Space Flight Operations Schedule (SFOS), a timeline display of the schedule of spacecraft activities for the Voyager mission is described. The tool consists of two parts: a series of programs that preprocess various command files and a graphics editor. The code of the graphics editor was developed with reusability as a primary objective and has since served as the basis for the generation of other automation tools. ESA

N91-22274*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.

GENERIC MESSAGE MANAGEMENT

CURTIS RAY WELBORN In ESA, Ground Data Systems for Spacecraft Control p 533-538 Oct. 1990
 Copyright Avail: NTIS HC/MF A99 CSCL 09/6

Monitoring the health and status of any dynamic system by a user always presented the problem of information overload if multiple events occur. This overload is often in the form of too many advisory messages sent to a display. To reduce information overload, only those messages which abstract the occurrence of an event may be printed. This solution has a problem in that there is no explanation given for why a high level message was generated. Generic Message Management (GMM), which is being developed to assist with information overload, message explanation, and historical logging for trend analysis, is discussed. ESA

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N91-22277*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

INFORMATION VISUALIZATION TECHNIQUES IN A MULTI-MISSION OPERATIONS ENVIRONMENT

EDMUND C. BAROTH, GREGORY E. CHIN, and PATRICK S. CURRAN / In ESA, Ground Data Systems for Spacecraft Control p 553-558 Oct. 1990 Sponsored by NASA, Washington Copyright Avail: NTIS HC/MF A99 CSCL 09/6

In the near future, the number of major missions flying simultaneously will increase. This increase in data will place a heavier burden on the operations staff to verify the health and status of a spacecraft or instrument platform. The problem of verification becomes particularly acute when multiple flight projects are being supported by the same personnel. Operations must be made more efficient and automated to remain successful. A prototype concept for achieving that goal is described. The prototype shows how the concepts of information visualization and information retrieval can be applied in developing a user oriented interface for a multimission operations environment. The proposed user interface integrates existing prototypes and includes two dimensional and three dimensional color graphics, animation, and simulation. Techniques of data realization are included. ESA

N91-22352*# Research Inst. for Advanced Computer Science, Moffett Field, CA.

EVALUATION PLAN FOR SPACE STATION NETWORK INTERFACE UNITS

ALFRED C. WEAVER Mar. 1990 80 p (Contract NCC9-16)

(NASA-CR-188088; NAS 1.26:188088) Avail: NTIS HC/MF A05 CSCL 22/2

Outlined here is a procedure for evaluating network interface units (NIUs) produced for the Space Station program. The procedures should be equally applicable to the data management system (DMS) testbed NIUs produced by Honeywell and IBM. The evaluation procedures are divided into four areas. Performance measurement tools are hardware and software that must be developed in order to evaluate NIU performance. Performance tests are a series of tests, each of which documents some specific characteristic of NIU and/or network performance. In general, these performance tests quantify the speed, capacity, latency, and reliability of message transmission under a wide variety of conditions. Functionality tests are a series of tests and code inspections that demonstrate the functionality of the particular subset of ISO protocols which have been implemented in a given NIU. Conformance tests are a series of tests which would expose whether or not selected features within the ISO protocols are present and interoperable. Author

N91-22730*# IBM Federal Systems Div., Owego, NY.

A CONCEPTUAL MODEL FOR MEGAPROGRAMMING

WILL TRACZ / In Houston Univ., RICIS Software Engineering 90 Symposium: Aerospace Applications and Research Directions Proceedings Appendices 12 p 1990 Avail: NTIS HC/MF A07 CSCL 09/2

Megaprogramming is component-based software engineering and life-cycle management. Megaprogramming and its relationship to other research initiatives (common prototyping system/common prototyping language, domain specific software architectures, and software understanding) are analyzed. The desirable attributes of megaprogramming software components are identified and a software development model and resulting prototype megaprogramming system (library interconnection language extended by annotated Ada) are described. Author

N91-22788*# National Aeronautics and Space Administration, Lewis Research Center, Cleveland, OH.

TECHNIQUES AND IMPLEMENTATION OF THE EMBEDDED RULE-BASED EXPERT SYSTEM USING ADA

EUGENE M. LIBERMAN (Sverdrup Technology, Inc., Brook Park, OH.) and ROBERT E. JONES / In NASA, Goddard Space Flight Center, The 1991 Goddard Conference on Space Applications of

Artificial Intelligence p 249-255 May 1991

Avail: NTIS HC/MF A16 CSCL 09/2

Ada is becoming an increasingly popular programming language for large Government-funded software projects. Ada with its portability, transportability, and maintainability lends itself well to today's complex programming environment. In addition, expert systems have also assured a growing role in providing human-like reasoning capability and expertise for computer systems. The integration of expert system technology with Ada programming language, specifically a rule-based expert system using an ART-Ada (Automated Reasoning Tool for Ada) system shell is discussed. The NASA Lewis Research Center was chosen as a beta test site for ART-Ada. The test was conducted by implementing the existing Autonomous Power EXpert System (APEX), a Lisp-base power expert system, in ART-Ada. Three components, the rule-based expert system, a graphics user interface, and communications software make up SMART-Ada (Systems fault Management with ART-Ada). The main objective, to conduct a beta test on the ART-Ada rule-based expert system shell, was achieved. The system is operational. New Ada tools will assist in future successful projects. ART-Ada is one such tool and is a viable alternative to the straight Ada code when an application requires a rule-based or knowledge-based approach. B.G.

N91-22932 Stanford Univ., CA.

VIEW OBJECTS FOR RELATIONAL DATABASES Ph.D. Thesis

THEIRRY BARSALOU 1990 332 p

Avail: Univ. Microfilms Order No. DA9102225

Many application domains require database techniques for modeling and managing entities of arbitrary structure: the so-called complex objects. At the same time, a major incentive to exploit database management systems is the ability to support sharing of data among applications. In practice, however, these two objectives tend to conflict. Storing information in the form of complex objects can seriously inhibit sharing, since persistent objects bind application-dependent knowledge to the data. On the other hand, the relational model provides information sharing through, for example, the definition of views, but it lacks the expressive power to represent complex entities. The view-object model is presented as a first step toward reconciling the opposing objectives of object-oriented access to shared information. By combining the relational-database concept of view and the programming-language concept of object, the view-object model supports simultaneously abstract complex units of information and sharing of those units. Base information remains stored in a fully normalized relational database; this regular representation facilitates sharing. View objects are defined by complex, arbitrary structures that map cleanly to the underlying database through the use of a semantic data model, the structural model. Hence, multiple view objects, specified over various parts of the database, offer different views of the data. Dynamic instantiation and update operations on view objects further support object-oriented manipulation of the information. In effect, the view-object model provides a unifying framework for merging database and knowledge-based techniques into an architecture for expert database systems. This methodology is implemented in a prototype system called PENGUIN, which defines an object layer on top of a relational database system. Dissert. Abstr.

N91-22933# General Accounting Office, Washington, DC.

SPACE DATA: NASA'S FUTURE DATA VOLUMES CREATE FORMIDABLE CHALLENGES

Apr. 1991 29 p

(GAO/IMTEC-91-24; REPT-B-240617) Avail: NTIS HC/MF A03

NASA has several initiatives underway to handle the processing and storage of future space and earth science data that will be generated at unprecedented rates and volumes. NASA believes that current initiatives in advanced storage media and in programs such as Customer Data and Operations Systems (CDOS) and Earth Observing System Data Information System (EOSDIS), combined with other initiatives, will meet future demands to process and store the expected deluge of data. CDOS and EOSDIS are information technology initiatives critical to NASA's ability to

efficiently and economically process, analyze, and store the massive amounts of earth and space science data. However, NASA will face many formidable development challenges before all future processing and storage demands can be met. Author

N91-22937# National Inst. of Standards and Technology, Gaithersburg, MD. Inst. for Computer Sciences and Technology.
GUIDE TO IRDS APPLICATIONS: GENERAL CONCEPTS AND STRATEGIC SYSTEMS PLANNING

MARGARET H. LAW *In its* Proceedings of the Federal Information Processing Standards (FIPS) Workshop on Information Resource Dictionary System (IRDS) Applications p 8-14 Dec. 1988
 Avail: NTIS HC/MF A09 CSCL 05/2

An information resource dictionary system (IRDS) is a data dictionary system used to design, monitor, protect, and control information systems. The IRDS standard represents federal and national efforts to provide quality data dictionary support for information engineering and management. The extensible schema capabilities of the IRDS permit the representation of a wide variety of CASE, data administration, and other system life cycle information in an Information Resource Dictionary (IRD), an application of the IRDS. Some of the topics covered include: (1) features of the IRDS; (2) predefined schema structures; (3) command language and panel interfaces; (4) extensible life cycle phase facility; (5) security facilities; and (6) strategic systems planning. K.S.

N91-22938# Mitre Corp., Houston, TX.

NASA-JOHNSON SPACE CENTER

SANDRA ANDERSON *In* NIST, Proceedings of the Federal Information Processing Standards (FIPS) Workshop on Information Resource Dictionary System (IRDS) Applications p 133-141 Dec. 1988
 Avail: NTIS HC/MF A09

The Information Resource Dictionary System (IRDS) is becoming more and more recognized as an integral part of the management of data at Johnson Space Center (JSC). The initial impetus for using a global IRDS came from the Space Station Program (SSP). The IRDS standard was specified in the Technical and Management Information System (TMIS) Request for Proposal (RFP). The TMIS is an SSP-wide information system supporting the technical and administrative needs of the NASA centers, the international partners, and the customers. The focus of this talk is the general use of the IRDS at the JSC. Author

N91-22939# Booz-Allen and Hamilton, Inc., Reston, VA.

NASA-SPACE STATION PROGRAM

STEPHEN J. RITZMAN *In* NIST, Proceedings of the Federal Information Processing Standards (FIPS) Workshop on Information Resource Dictionary System (IRDS) Applications p 142-152 Dec. 1988
 Avail: NTIS HC/MF A09

This talk concerns the Technical and Management Information System (TMIS) project and issues related to other systems within the Space Station Program (SSP) as well as the impact of the Information Resource Dictionary System (IRDS) on them. Some of the topics discussed include: (1) information management; (2) program management; (3) software development; (4) the Space Station Information System; (5) the TMIS; (6) information transfer systems; (7) the three characteristics of the information resources that are going to exist in the different system domains; and (8) interoperability, data transportability, and commonality. K.S.

N91-22940# Assistant Secretary of the Air Force, Washington, DC. Deputy Director for Scientific and Technical Information.

DOCUMENT MARKING

WALTER R. BLADOS, ALLAN D. KUHN, and CHARLIE MAIORANA Apr. 1990 24 p Prepared in cooperation with INFO/tek, Washington, DC
 (AD-A231150; USAF-STINFO-MANAGEMENT-90/4; SAF/AQT-SR-90-004) Avail: NTIS HC/MF A03 CSCL 05/2

This document describes the DoD document marking system. The two basic purposes are discussed: (1) to identify documents

that contain export-controlled information (the dissemination of which is set by statute); and (2) to facilitate dissemination by explicitly indicating the extent of secondary distribution permissible without further authorization by the originator. This document provides summary information about the Technical Document Distribution Program and the Export-Control Program which are two separate and distinct programs. This document may be used in conjunction with its companion video, or separately. GRA

N91-23347*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, OH.

AN ASSESSMENT OF TECHNOLOGY ALTERNATIVES FOR TELECOMMUNICATIONS AND INFORMATION MANAGEMENT FOR THE SPACE EXPLORATION INITIATIVE

DENISE S. PONCHAK and JOHN E. ZUZAK Apr. 1991 25 p (NASA-TM-103783; E-6058; NAS 1.15:103783) Avail: NTIS HC/MF A03 CSCL 17/2

On the 20th anniversary of the Apollo 11 lunar landing, President Bush set forth ambitious goals for expanding human presence in the solar system. The Space Exploration Initiative (SEI) addresses these goals beginning with Space Station Freedom, followed by a permanent return to the Moon, and a manned mission to Mars. A well designed, adaptive Telecommunications, Navigation, and Information Management (TNIM) infrastructure is vital to the success of these missions. Utilizing initial projections of user requirements, a team under the direction of NASA's Office of Space Operations developed overall architectures and point designs to implement the TNIM functions for the Lunar and Mars mission scenarios. Based on these designs, an assessment of technology alternatives for the telecommunications and information management functions was performed. This technology assessment identifies technology developments necessary to meet the telecommunications and information management system requirements for SEI. Technology requirements, technology needs and alternatives, the present level of technology readiness in each area, and a schedule for development are presented. Author

N91-23937 Stevens Inst. of Tech., Hoboken, NJ.

NONEQUILIBRIUM GREEN'S FUNCTIONS AND QUANTUM TRANSPORT THEORY FOR SEMICONDUCTOR MICROSTRUCTURES Ph.D. Thesis

HUM CHI TSO 1990 233 p

Avail: Univ. Microfilms Order No. DA9103501

Nonlinear quantum transport theory and its linear limit are examined for semiconductor microstructures, including quantum wells and superlattices. The problem of linear cyclotron resonance is treated using a memory function approach for a type I semiconductor superlattice with interacting quantum wells subject to impurity and phonon scatterings. Furthermore, a fully microscopic quantum field theoretical description of transport is developed in terms of nonequilibrium generating Green's functions, culminating in the analysis of the transient time development of negative absolute minority electron mobility at low temperature in an electron-hole plasma in a quantum well. In this connection, the microscopic dynamics for a coupled electron-hole-phonon system with electron-electron and hole-hole interactions are set forth, as well as the electron-hole attraction responsible for drag phenomena. The coupled fields equations for the one-electron and one-hole Green's functions, and for the electron-hole Green's functions, and for the two-electron and two-hole Green's functions, which involve the mixed Green's functions for the one electron or one hole and phonon state variable are derived. The effective interactions are also derived on this basis as well as the dressed phonon propagator. A generalized shielded potential approximation is propounded and an exact variational differential counterpart of the GKB ansatz is developed after separating of the gauge dependence of the physical Green's function in the presence of interactions. Linearized time-dependent coupled electron and hole Wigner function transport equations are analyzed numerically to study the transient time development of negative electron mobility, including both electron and hole overshoot phenomena, and the approach to steady state subject to dynamic nonlocal electron and hole screening effects. Dissert. Abstr.

05 COMPUTERS AND INFORMATION MANAGEMENT

N91-23982# Office of Management and Budget, Washington, DC. Office of Information and Regulatory Affairs.

FIVE-YEAR PLAN FOR MEETING THE AUTOMATIC DATA PROCESSING AND TELECOMMUNICATIONS NEEDS OF THE FEDERAL GOVERNMENT

Nov. 1990 150 p

(PB91-103549) Avail: NTIS HC/MF A07; also available SOD HC \$10.00 as 041-001-00355-0 CSDL 05/2

Information is provided on the information systems and technology activities of the Federal government and fulfillment of the requirements of the Paperwork Reduction Act of 1980. The plan covers fiscal years 1991 through 1992. Three parts are included: (1) a summary of resource estimates; (2) a discussion of themes and directions; and (3) strategic overviews. Author

N91-24048*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.

TRANSPORTABLE APPLICATIONS ENVIRONMENT (TAE) PLUS: A NASA USER INTERFACE DEVELOPMENT AND MANAGEMENT SYSTEM

MARTHA R. SZCZUR *In* NASA, Washington, Technology 2000, Volume 2 p 56-66 1991

Avail: NTIS HC/MF A16 CSDL 09/2

The transportable Applications Environment Plus (TAE Plus), developed at the NASA Goddard Space Flight Center, is a portable, What you see is what you get (WYSIWYG) user interface development and management system. Its primary objective is to provide an integrated software environment that allows interactive prototyping and development of graphical user interfaces, as well as management of the user interface within the operational domain. TAE Plus is being applied to many types of applications, and what TAE Plus provides, how the implementation has utilized state-of-the-art technologies within graphic workstations, and how it has been used both within and without NASA are discussed. Author

N91-24942 Research Libraries Group, Inc., Mountain View, CA. **INFORMATION NEEDS IN THE SCIENCES: AN ASSESSMENT** CONSTANCE C. GOULD and KARLA PEARCE Mar. 1991 85 p

Copyright Avail: Issuing Activity

This assessment of information needs in eight science disciplines was produced to guide the activities of the Research Libraries Group's Program for Research Information Management. The purpose of this assessment is to obtain a broad view of the shape of each discipline and to illuminate the relationship between these trends and the data requirements of the discipline. Disciplines included are physics, chemistry, biology, geosciences, astronomy, engineering, mathematics, and computer science. Author

N91-24951*# National Aeronautics and Space Administration, Washington, DC.

QUO VADIMUS: COMING TO GRIPS WITH THE INFORMATION WORLD

WALTER R. BLADOS May 1991 10 p

(NASA-TM-105138; NAS 1.15:105138) Avail: NTIS HC/MF A02 CSDL 05/2

The new information-oriented culture in which we find ourselves has created new relationships, new stimulating and expanding opportunities, new methods of doing our work, and new environments in which we carry out our work. An integral part of the NASA aerospace research and development (R and D) process is the scientific and technical information (STI) associated with it; it is both a raw material (input) and a product (output) of this process. Within this process, the NASA STI Program is tasked to provide information management and services, to ensure that accurate and timely STI is generated and entered into an appropriate information service and made available in a usable form to those who have a need for it; in essence, a means to exploit both internal (NASA corporate) and pertinent external (other governmental/industrial/foreign) information to meet the requirements of the R and D community. To understand the STI Program management issues, it is critical to understand the role

of the STI Program in the context of the R and D process. STI management must become part of the accepted culture of the R and D community, but it cannot become so unless adopted and accepted by it. A start should be made now to integrate the NASA STI Program into the R and D infrastructure, including funding and operational control. Within this infrastructure, we must obtain management commitment, review and produce policy reflecting the organizational status, allocate responsibilities, and set to work on implementing the true requirements of the R and D community. Author

N91-25450*# Sterling Software, Moffett Field, CA. **THE PILOT LAND DATA SYSTEM (PLDS) AT THE AMES RESEARCH CENTER MANAGES AIRCRAFT DATA IN COLLABORATION WITH AN ECOSYSTEM RESEARCH PROJECT**

GARY ANGELICI, LIDIA POPOVICI, and JAY SKILES *In* NASA, Washington, 4th Airborne Geoscience Workshop p 93-95 1991 Avail: NTIS HC/MF A13 CSDL 05/2

The Pilot Land Data System (PLDS) is a data and information system serving NASA-supported investigators in the land science community. The three nodes of the PLDS, one each at the Ames Research Center (ARC), the Goddard Space Flight Center (GSFC) and the Jet Propulsion Laboratory (JPL), cooperate in providing consistent information describing the various data holding in the hardware and software (accessible via network and modem) that provide information about and access to PLDS-held data, which is available for distribution. A major new activity of the PLDS node at the Ames Research Center involves the interaction of the PLDS with an active NASA ecosystem science project, the Oregon Transect Ecosystems Research involves the management of, access to, and distribution of the large volume of widely-varying aircraft data collected by OTTER. The OTTER project, is managed by researchers at the Ames Research Center and Oregon State University. Its principal objective is to estimate major fluxes of carbon, nitrogen, and water of forest ecosystems using an ecosystem process model driven by remote sensing data. Ten researchers at NASA centers and universities are analyzing data for six sites along a temperature-moisture gradient across the western half of central Oregon (called the Oregon Transect). Sensors mounted on six different aircraft have acquired data over the Oregon Transect in support of the OTTER project. Author

N91-25947 University of Technology, Loughborough (England). **PERSONAL INFORMATION SYSTEMS: THE IMPLICATIONS OF JOB AND INDIVIDUAL DIFFERENCES FOR DESIGN Ph.D.**

Thesis

SUSAN COLES 1990 369 p

Avail: Univ. Microfilms Order No. BRDX91840

In an age where information has become a crucial commodity, accessing appropriate information quickly is essential to economic success. Developing ways of improving information retrieval is therefore of central concern to human factors and technologists alike. One aspect of information access relates to the ability of individual office workers to manage and retrieve their own information effectively, and this is what the present research addresses. Previous work in the area has been dominated by designing computer interfaces for the average user. This research investigates how people's needs might differ according to circumstance and examines a wider range of design possibilities. Specifically, it sets out to relate retrieval problems (specific information retrieval rather than e.g., browsing or reminding) to job and individual (personality) differences within the general context of personal information management in offices using traditional technologies of paper, filing cabinets and desks. This is achieved by both extensive fieldwork and the use of simulated filing-retrieval systems in a controlled context. The work thus specifies conditions under which retrieval difficulties occur and suggests how they might be causally operative. The findings permit the generation of hypotheses concerning situations where retrieval problems are likely to be critical and novel avenues for improving performance, covering job design, changes to information management techniques (training and equipment design), and

personnel selection. Techniques for predicting situations where poor retrieval could occur are put forward, and how methods of improving performance might be applied in offices explored.

Dissert. Abstr.

N91-25958*# Old Dominion Univ., Norfolk, VA. Dept. of Computer Science.

AN INTEGRATED DECISION SUPPORT SYSTEM FOR TRAC: A PROPOSAL

RAVI MUKKAMALA *In its Performance Related Issues in Distributed Database Systems* 24 p Jul. 1991

Avail: NTIS HC/MF A04 CSCL 05/2

Optimal allocation and usage of resources is a key to effective management. Resources of concern to TRAC are: Manpower (PSY), Money (Travel, contracts), Computing, Data, Models, etc. Management activities of TRAC include: Planning, Programming, Tasking, Monitoring, Updating, and Coordinating. Existing systems are insufficient, not completely automated, manpower intensive, and has the potential for data inconsistency exists. A system is proposed which suggests a means to integrate all project management activities of TRAC through the development of a sophisticated software and by utilizing the existing computing systems and network resources. The systems integration proposal is examined in detail.

Author

N91-25962# Los Alamos National Lab., NM.

REPORT ON SECURITY ISSUES IN DATABASE SYSTEMS

L. M. HARRIS Apr. 1991 65 p

(Contract W-7405-ENG-36)

(DE91-011101; LA-11938-MS) Avail: NTIS HC/MF A04

This report reviews the procedures and methodology associated with the security evaluation of the Nuclear Weapons Complex Network (NWCnet) WBCN Gateway software. NWCnet, built by the DOE Albuquerque Operations Office and the Computer Integrated Manufacturing (CIM) Program Office, was an early attempt by the DOE to build a complex-wide network for classified data processing. The development of NWCnet broke new ground in DOE computer security management and identified several complex security issues for which new security design and planning techniques were developed. The requirement for a comprehensive security evaluation of each NWCnet service component was established by the CIM Program Office in conjunction with the DOE Office of Safeguards and Security. The goals of the requirement were to establish the network's overall security and to provide a technical basis on which to certify and accredit the network. The DOE Center for Computer Security served as the focal point for this activity, functioned as a liaison between the NWCnet project development team and the security examination teams, and was responsible for coordinating, planning, and conducting the software reviews. In the process of designing and evaluating the WBCN Gateway software, significant knowledge was gained regarding the function of the software and the security evaluation process. Not only did the evaluators learn how to test software in the face of continual change, but they also began to understand how to evaluate the security of the network. This report documents the lessons learned from the evaluation activities and communicates this knowledge. The report focuses on the problems (and solutions) encountered in testing a long-term project undergoing continual, major change.

DOE

N91-25965# Sandia National Labs., Albuquerque, NM.

PROGRESS IN INFORMAL INFORMATION MANAGEMENT: THE CENTRAL TECHNICAL FILE

C. E. PASTERCZYK 1991 6 p Presented at the Infotech 1991, Oak Ridge, 22-23 May 1991

(Contract DE-AC04-76DP-00789)

(DE91-010863; SAND-91-0270C; CONF-9105153-1) Avail: NTIS HC/MF A02

One objective of the Sandia Technical Library is to improve the management of unpublished, informal information to respond to (hor ellipsis) information needs and requirements. The Central Technical File (CTF) is an archive of informal documents in Sandia National Laboratories technical programs which has been

maintained by the Technical Library since 1952. CTF serves as a corporate memory for the Laboratories. The progress made in the last year to help CTF better meet Library objectives is described.

DOE

N91-26787# Bell Communications Research, Inc., Morristown, NJ.

COORDINATION IN LARGE SCALE SOFTWARE DEVELOPMENT

ROBERT E. KRAUT and LYNN A. STREETER 1990 23 p

(AD-A234898) Avail: NTIS HC/MF A03 CSCL 12/5

Successful software development requires tight coordination among subgroups involved in the development process. Coordination is difficult because of the division of labor, interdependence and uncertainty inherent in large software projects. A survey in 65 software development projects reveals that informal communication is necessary for coordination under these circumstances. Results show that software professionals got much of their information from other people. They perceived that interpersonal techniques for getting information from beyond their immediate work group were underused, while more formal procedures for tracking routine information were overused compared to their value. Technically uncertain projects and highly interdependent ones had staffs who were poorly informed and were poorly coordinated. When project members had a large network of personal contacts outside the project, information flow improved, especially when the project was uncertain. The paper concludes with organizational and technological suggestions for increasing the flow of relevant information across functional boundaries in projects.

GRA

N91-27004# Naval Ocean Systems Center, San Diego, CA.

ON-LINE MAGNETIC TAPE LIBRARY INVENTORY TRACKING AND REPORTING (LITAR) SYSTEM Final Report, FY 1990 - FY 1991

M. G. CERUTI, R. A. AUCLAIR, J. P. SCHILL, and K. YARNELL Mar. 1991 18 p

(AD-A234934; NOSC/TD-2057) Avail: NTIS HC/MF A03 CSCL 12/7

The design and operation of the On Line Magnetic Tape Library Inventory Tracking and Reporting (LITAR) System is summarized. The system was developed by NOSC personnel to access efficiently administrative and content information about the magnetic tapes used for supporting database development in the NOSC Information Management Engineering (IME) Laboratory. This user interface was originally developed for tapes classified Secret or below, using ORACLE Relational Database Management System's SQL*FORMS on a VAX 8550. However, the interface has more general applications outside of this environment. Examples of user-input screens are also presented.

GRA

N91-27027*# Sterling Software, Moffett Field, CA.

REQUIREMENTS MANAGEMENT: A CSR'S PERSPECTIVE

JOANIE THOMPSON *In NASA. Goddard Space Flight Center, Proceedings of the Second Annual NASA Science Internet User Working Group Conference* p 291-328 May 1991

Avail: NTIS HC/MF A19 CSCL 05/2

The following subject areas are covered: customer service overview of network service request processing; Customer Service Representative (CSR) responsibility matrix; extract from a sample Memorandum of Understanding; Network Service Request Form and its instructions sample notification of receipt; and requirements management in the NASA Science Internet.

Author

N91-27031*# Sterling Software, Moffett Field, CA.

NSI CONFERENCE SUPPORT

SUSAN AARON *In NASA. Goddard Space Flight Center, Proceedings of the Second Annual NASA Science Internet User Working Group Conference* p 367-375 May 1991

Avail: NTIS HC/MF A19 CSCL 05/2

One of the many services NSI provides as an extension of customer/user support is to attend major scientific conferences. The conference effort provides NASA/OSSA scientists with many

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benefits: (1) scientist get to see NSI in action; they utilize the network to read email, and have recently begun to demonstrate their scientific research to their colleagues; (2) scientist get an opportunity to meet and interact with NSI Staff, which gives scientists a chance to get status on their requirements, ask about network status, get acquainted with our procedures, and learn about services; and (3) scientists are exposed to networking in a larger sense; particularly by knowing about other NASA groups who provide valuable scientific resources over the Internet.

Author

N91-27035*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.

A GUIDE TO NASA'S PILOT LAND DATA SYSTEM (PLDS)

In its Proceedings of the Second Annual NASA Science Internet User Working Group Conference p 403-404 May 1991

Avail: NTIS HC/MF A19 CSCL 05/2

NASA's Pilot Land Data System (PLDS) is a distributed information management system designed to support NASA's land science community. The PLDS provides a wide range of services including management of information about scientific data, access to a library of scientific data, a data ordering capability, communications, connection to data analysis facilities, and electronic mail. The PLDS provides these services by offering the scientist the capability to search for and order data, and to communicate electronically with other scientists and computers. Three functions enable scientists to find what data are available and where they reside. The first two, Find data summaries and Read detailed descriptions give summary and detailed descriptions about data sets or groups of related data sets, science, projects, and institutions which archive land data. The third, gives information about specific pieces of data. This last function has two components, Search systemwide inventory and Search local inventory. The first component enables the user to find data elements (images, geological samples, transects, maps, etc.) that exist anywhere in the PLDS while the second has only information about data at the local site. The first enables the user to find pieces of data from several different data sets with the same temporal and spatial coverage and other elements common to most data sets, while the second allows the user to select a data set based on these descriptors and on those that are unique to a data set. The PLDS provides capabilities that enable electronic file transfers, intercomputer connection, and electronic mail. Both TCP/IP and DECnet protocols are supported via the NASA Science Internet (NIS). Access is also available through Telenet. Author

N91-27788# Carnegie-Mellon Univ., Pittsburgh, PA. Software Engineering Inst.

TRANSACTION-ORIENTED CONFIGURATION MANAGEMENT: A CASE STUDY

PETER H. FEILER and GRACE F. DOWNEY Nov. 1990 53 p (AD-A235510; CMU/SEI-90-TR-23; ESD-90-TR-224) Avail: NTIS HC/MF A04 CSCL 12/5

Software configuration management (SCM) is a key element of the software development process. A number of new configuration management techniques in commercial SCM tools and environments with SCM capabilities have been observed. This report illustrates some of the advances in SCM concepts by example of a particular commercial system, the Sun Network Software Environment (NSE). NSE embodies a transaction model of configuration management. In order to demonstrate the capabilities and limitations of the transaction model, NSE is applied to three problem areas for configurations management: adaption for parallel development and team support, development and maintenance in software families and development in a distributed and heterogeneous network. GRA

N91-27792# Carnegie-Mellon Univ., Pittsburgh, PA. Software Engineering Inst.

TOOL VERSION MANAGEMENT TECHNOLOGY: A CASE STUDY Final Report

PETER H. FEILER and GRACE F. DOWNEY Nov. 1990 35 p

(Contract F19628-90-C-0003)

(AD-A235639; CMU/SEI-90-TR-25; ESDXF-TR-90-226ESD)

Avail: NTIS HC/MF A03 CSCL 12/5

This report describes a portion of the problem of maintaining tools for the purpose of software development. It discusses an innovative solution to tool version management available in the commercially available Network Software Environment from Sun Microsystems, Inc. It applies NSE mechanisms to solve three problems that are common to the use and management of tools for software development. The primary focus of this task is on environment support for the management of tool versions and automation of tool version management and selection, and to discuss an innovative solution available in a commercial software development environment. We discuss a problem that any facility providing support for software development faces: the management of software development tools. The problem is broken down into three issues: tool version organization and selection, the stability of selected tool versions and the application context of selected tool versions. GRA

N91-27798# Carnegie-Mellon Univ., Pittsburgh, PA. Software Engineering Inst.

SOFTWARE CONFIGURATION MANAGEMENT Final Report

JAMES E. TOMAYKO Dec. 1990 19 p

(Contract F19628-90-C-0003)

(AD-A235702; CMU/SEI-CM-4-1-4) Avail: NTIS HC/MF A03 CSCL 12/5

Software configuration management encompasses the disciplines and techniques of initiating, evaluating, and controlling change to software products during and after the development process. It emphasizes the importance of configuration control in managing software production. Configuration management is an integral part of the software development process across all phases of the life cycle. It functions as a controlling discipline, enabling changes to be made to existing documentation and products in such a way as not to destroy the integrity of the software. Since configuration management extends over the life of the product, and since tools, techniques, and standard exist solely aimed at its proper execution, configuration management can stand alone as a module within a graduate curriculum. The module presented here is intended to be an indepth consideration of configuration management, including configuration item identification, change reporting and evaluation change, execution, tool evaluation and use, version control, and management principles related to configuration control. GRA

N91-27803# Carnegie-Mellon Univ., Pittsburgh, PA. Software Engineering Inst.

SPECTRUM OF FUNCTIONALITY IN CONFIGURATION MANAGEMENT SYSTEMS Final Report

SUSAN DART Dec. 1990 43 p

(Contract F96289-90-C-0003)

(AD-A235753; CMU/SEI-90-TR-11; ESD-90-TR-212) Avail: NTIS HC/MF A03 CSCL 12/5

The Software Environments Project at the Software Engineering institute has found considerable progress concerning support for software configuration management (CM) in environments and tools. This paper's intent is to highlight a spectrum of features provided by existing CM systems. The spectrum shows features as being extensions or generalizations of other features and these extensions represent the progress. As part of presenting the features, the scope of issues concerning users of CM systems is discussed. No single CM system provides all the functionality required by the different kinds of users of CM systems. Rather, each CM system addresses some part of a spectrum of functionality. To complete the report, several configuration management systems are briefly described. Software CM is a discipline for controlling the evolution of software systems. GRA

N91-27807# Carnegie-Mellon Univ., Pittsburgh, PA. Software Engineering Inst.

APSE INTERACTIVE MONITOR: A SOFTWARE ARTIFACT FOR SOFTWARE ENGINEERING EDUCATION

Materials Report

CHARLES B. ENGLE, GARY FORD, and JAMES E. TOMAYKO
Nov. 1989 21 p
(Contract F19628-90-C-0003)
(AD-A235777; CMU/SEI-89-EM-2) Avail: NTIS HC/MF A03
CSCL 09/2

In 1987 the SEI began a search for a well-documented Ada system, developed under government contract, that could be used in software engineering education. The APSE Interactive Monitor (AIM) was determined to be appropriate for this purpose. This system acts as an interface between a user of an Ada programming support environment (APSE) and the programs that the user executes in the APSE. It provides facilities to support the concurrent execution of multiple interactive programs, each of which has access to a virtual terminal. Educational uses of the system and described, including use as a case study and as the basis for exercises. Software engineering topics that can be taught with the system include software maintenance, configuration management, software documentation, cost estimation, and object-oriented design. GRA

N91-27811# Carnegie-Mellon Univ., Pittsburgh, PA. Software Engineering Inst.

THE SQL ADA MODULE DESCRIPTION LANGUAGE SAMEDL

Final Report

GARY J. CHASTEK, MARC H. GRAHAM, and GREGORY ZELESNIK Nov. 1990 128 p
(Contract F19628-90-C-0003)
(AD-A235781; CMU/SEI-90-TR-26; ESD-90-TR-227) Avail: NTIS
HC/MF A07 CSCL 12/5

A reference manual is presented for the SQL Ada Module Description Language (SAMEDL). The SAMEDL is used to describe database services needed by Ada application programs. The Structured Query Language (SQL) Ada Module Description Language (SAMEDL) automates the construction of software designed to use the SQL Ada Module Extensions application architecture. Such applications are, in particular, written in Ada and use data-base management systems (DBMS) whose data manipulation language is SQL. The meaning of a SAMEDL compilation unit is given by: (1) An SQL module, conforming to the SQL standard, possibly with DBMS implementation-specific extensions; (2) An Ada compilation unit, conforming to the Ada standard; and (3) Rules concerning the relationship between the SQL and Ada texts. The goal of the SQL Ada Module Extensions (SAME) is to produce robust database application programs written in a style suitable to Ada. The goal of the SAMEDL is to provide a binding of Ada and SQL based upon the SAME. A style suitable to Ada means that an interface generated by the SAMEDL views the interaction between the application program and the database as a design object, separating database knowledge from the application program, and thereby yielding the potential for increased specialization of software development. GRA

N91-27812# Carnegie-Mellon Univ., Pittsburgh, PA. Software Engineering Inst.

CONFIGURATION MANAGEMENT MODELS IN COMMERCIAL ENVIRONMENTS

Final Report

PETER H. FEILER Mar. 1991 61 p
(Contract F19628-90-C-0003)
(AD-A235782; CMU/SEI-91-TR-7; ESD-91-TR-7) Avail: NTIS
HC/MF A04 CSCL 12/5

A number of advances can be observed in recent commercial software development environments in support of configuration management (CM). These advances include: configurations as managed objects; transparent access to repositories; and, in addition to the familiar checkout/checkin model, three CM models based on configurations. These CM models are the composition model, the long transaction model, and the change set model. Typically, one or two of the models can be found in a system.

The models are analyzed with respect to their potential impact on the software development process, resulting in several observations. Some of the models exist in a number of variations, each impacting the software process differently. CM capabilities can be found not only in CM tools and environment frameworks, but also in development tools. Integration of such tools into environments raises the need for different CM models to interoperate. Therefore, it is desirable to evolve to a unified CM model that encompasses the full range of CM concepts and can be adapted to different process needs. GRA

N91-27813# Carnegie-Mellon Univ., Pittsburgh, PA. Software Engineering Inst.

INFORMATICS FOR A NEW CENTURY: COMPUTING EDUCATION FOR THE 1990S AND BEYOND

Final Report

MARY SHAW Jul. 1990 26 p
(Contract F19628-90-C-0003)
(AD-A235783; CMU/SEI-90-TR-15; ESD-90-TR-216) Avail: NTIS
HC/MF A03 CSCL 05/2

Information technology and computer science have not only reshaped computation, communication, and commerce; they have expanded the basic models and paradigms of many disciplines. Informatics education has obligations to all the communities that rely on information technology, not just the computing professionals. Serving this extended audience well requires changes in the content and presentation of computing curricula. The coming needs are sketched for information processing and the populations are analyzed that will require informatics education. Curriculum requirements are considered through two examples, one outside the traditional boundary of computer science and one inside. GRA

N91-27838# Carnegie-Mellon Univ., Pittsburgh, PA. Software Engineering Inst.

SOFTWARE ENGINEERING INSTITUTE QUARTERLY UPDATE, JANUARY-MARCH 1991

Mar. 1991 39 p
(AD-A236099; ADE-0401007) Avail: NTIS HC/MF A03 CSCL
12/5

The Software Process Program focuses on improving the process of software development. Projects within the program are assessing the actual practice of software engineering in the defense community, training organizations to gain management control over their software development processes, supporting the use of quantitative methods and measures as a basis for process improvement, and developing improved methods for software process management. Some areas of discussion are as follows: Software Process; Software Engineering Techniques, Real Time Distributed Systems; Software Risk Management; Special Projects; Software Engineering Education; DARPA/STARS Support. GRA

N91-28033*# National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.

NASA/DOD AEROSPACE KNOWLEDGE DIFFUSION

RESEARCH PROJECT: THE DOD PERSPECTIVE

Paper No. 7
THOMAS E. PINELLI and JOHN M. KENNEDY 1 Nov. 1990
26 p Presented at the Defense Technical Information Center 1990 Annual Users Training Conference, Alexandria, VA Prepared in cooperation with Indiana Univ., Bloomington
(NASA-TM-101746; NAS 1.15:101746; AD-A235648) Avail: NTIS
HC/MF A03 CSCL 05/2

This project will provide descriptive and analytical data regarding the flow of STI at the individual, organizational, national, and international levels. It will examine both the channels used to communicate information and the social system of the aerospace knowledge diffusion process. Results of the project should provide useful information to R and D managers, information managers, and others concerned with improving access to and use of STI. Objectives include: (1) understanding the aerospace knowledge diffusion process at the individual, organizational, and national levels, placing particular emphasis on the diffusion of Federally funded aerospace STI; (2) understanding the international aerospace knowledge diffusion process at the individual and

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organizational levels, placing particular emphasis on the systems used to diffuse the results of Federally funded aerospace STI; (3) understanding the roles NASA/DoD technical report and aerospace librarians play in the transfer and use of knowledge derived from Federally funded aerospace R and D; (4) achieving recognition and acceptance within NASA, DoD and throughout the aerospace community that STI is a valuable strategic resource for innovation, problem solving, and productivity; and (5) providing results that can be used to optimize the effectiveness and efficiency of the Federal STI aerospace transfer system and exchange mechanism. GRA

N91-28034# Logistics Management Inst., Bethesda, MD.
DOD'S TECHNICAL INFORMATION PUBLISHING: A STRATEGY FOR EVOLUTION Final Report
KENNETH W. LINDSTROM, FRANK GILBANE, and JAMES E. GILES, III Feb. 1991 42 p
(Contract MDA903-85-C-0139)
(AD-A235749; LMI-PL811R1) Avail: NTIS HC/MF A03 CSCL 05/2

Acquisition, publishing, and maintenance of technical information is vital to support weapon systems over their life cycles. The Military Departments use technical information to make tradeoff decisions during the weapon system acquisition process and to meet fielded system requirements for training, operation, and maintenance (preventive, corrective, rework, reprourement, etc.). Technical information can cost as much as 20 percent of acquisition and support costs of new weapon systems. Technological changes sweeping the publishing industry enable a new approach for acquiring, publishing, and managing technical information. These changes include: advances in computers, improved information management, and the adoption by DoD and many of its suppliers of new international digital information exchange standards. In aggregate, we will refer to these changes and the new approach they mandate as digital Technical Information Publishing (TIP) - the dynamic organization, retrieval, and presentation of information in different media on demand. Adoption of TIP will facilitate greatly acquisition, distribution, and maintenance of DoD's technical information. This report addresses these problems. It discusses the state of publishing technology, describes a conceptual framework based on a technical information database that supports TIP, and concludes with recommendations for implementing TIP. GRA

N91-28035# Colorado Univ., Colorado Springs.
MANAGEMENT OF INFORMATION TECHNOLOGY ACCESS CONTROLS M.S. Thesis
MICHAEL R. POLLACK 1991 118 p
(AD-A236275) Avail: NTIS HC/MF A06 CSCL 12/7

System access control directs, regulates, and coordinates the logical, physical, and administrative protection capabilities pertaining to interactions with an information system (IS). System access control, a subset of information technology (IT) and general business controls, are IS security's critical first line of defense. It has traditionally progressed by increasing the speed and memory, and decreasing the size of centralized IS. However, recent movements toward distributed IS and the accompanying architectural changes present new management challenges, especially in the area of controlling system access. Distributed IS magnifies potential control problems because it relies upon inherently less secure hardware and software, and increases potential system access points through local and telecommunication interconnection. However, the biggest threat to system access control is found within the organization's own workforce. These issues motivated the development of an Access Control Management Model. GRA

N91-28043*# National Inst. of Standards and Technology, Gaithersburg, MD.
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION'S (NASA) AUTOMATED INFORMATION SECURITY HANDBOOK
E. ROBACK Mar. 1991 107 p

(NASA-CR-188682; NAS 1.26:188682; PB91-187781; NISTIR-4518; NHB-2410.9) Avail: NTIS HC/MF A06 CSCL 05/2

The NASA Automated Information Security Handbook provides NASA's overall approach to automated information systems security including discussions of such aspects as: program goals and objectives, assignment of responsibilities, risk assessment, foreign national access, contingency planning and disaster recovery, awareness training, procurement, certification, planning, and special considerations for microcomputers. Author

N91-28737# California Univ., Berkeley. Lawrence Berkeley Lab.

THE ROLE OF THE UNIX(TM) CENTRAL COMPUTING FACILITY IN A MULTI-PURPOSE NATIONAL LABORATORY

C. A. EADES Mar. 1991 13 p Presented at the Conference on Computing in High Energy Physics, Tsukuba, Japan, 11-15 Mar. 1991

(Contract DE-AC03-76SF-00098)
(DE91-012361; LBL-30411; CONF-910373-11) Avail: NTIS HC/MF A03

In the last ten years, a significant change has been seen in the role of the central computing facility. This has been brought about by the new technology and the evolving needs of the research community. The current efforts are discussed of the central computing facility's UNIX Group at Lawrence Berkeley Laboratory to address these changes in technology and the needs of its research groups. There are three general areas of discussion. In the first, management, the costs are discussed of system management in a distributed computing environment; current computing issues, including the impact of workstation technology on the laboratory infrastructure, the advantages and disadvantages of diskless workstations in the laboratory environment as well as the need for high reliability file services it implies. In the second, mass storage, the need for and an implementation of mass storage service to the laboratory community is discussed. Issues are also discussed such as network access and integration strategies. In the third, other types of service provided by the central facility are also discussed, including common software export via high availability Network File Services servers, distributed high quality output devices and the role of the central facility in providing computer security. DOE

N91-28739 Utah Univ., Salt Lake City.
MICROCOMPUTERS: AN EXPLORATORY STUDY OF THEIR AVAILABILITY AND USE IN THE RESEARCH PROCESS AND THEIR CONTRIBUTION TO RESEARCHER PRODUCTIVITY
Ph.D. Thesis

JOHN CHARLES BERNHARDT 1990 233 p
Avail: Univ. Microfilms Order No. DA9112745

The primary purpose was to determine what relationship existed between the reported average percentage of research hours involving microcomputer use during the years 1987 to 1989 and 10 measures of researcher productivity. The measures of researcher productivity used included: (1) total number of research achievements; (2) total number of academic journal publications; (3) total number of top-tier journal publications; (4) total number of meetings presentations; and (5) total number of proceedings publications during the 3-year period as well as counterpart variables adjusted for average weekly hours of research effort. Dissert. Abstr.

N91-28743# Carnegie-Mellon Univ., Pittsburgh, PA. Software Engineering Inst.

THE SOFTWARE TECHNICAL REVIEW PROCESS Final Report

JAMES S. COLLOFELLO Jun. 1988 20 p Prepared in cooperation with Arizona State Univ., Tempe

(Contract F19628-90-C-0003)
(AD-A236139; SEI-CM-3-1-5) Avail: NTIS HC/MF A03 CSCL 12/5

This module consists of a comprehensive examination of the technical review process in the software development and maintenance life cycle. Formal review methodologies are analyzed

in detail from the perspective of the review participants, project management and software quality assurance. Sample review agendas are also presented for common types of reviews. The objective of the module is to provide the student with the information necessary to plan and execute highly efficient and cost effective technical reviews. GRA

N91-28761 Pennsylvania Univ., Philadelphia.
A LOGIC MODEL FOR MODEL MANAGEMENT: AN EMBEDDED LANGUAGES APPROACH Ph.D. Thesis
 HEMANT KUMAR BHARGAVA 1990 177 p
 Avail: Univ. Microfilms Order No. DA9112534

The executable modeling language (EML) is extended. It is argued that existing modeling systems lack adequate means for representing, and usefully extracting, much information about models and modeling elements other than that required to just solve models. It aims to provide a formal, general means to represent and usefully extract such information, by developing the embedded languages technique and applying it to model management. In the embedded languages technique (as applied to model management), an EML, which partially formalizes the target language that is used to represent, describe, and reason about models, is embedded within a formal embedding language for model management. The technique creates dual interpretation for the symbols and expressions in the embedded language through rules of formation, such that terms and formulas in the embedded language can be treated as terms in the embedding language. This strategy enables the embedded language to: (1) represent rigorously, flexibly, and with generality, a rich variety of qualitative knowledge about models that could normally not be stated in the modeling language itself; (2) use this knowledge in defining inferences that are useful in the modeling process; (3) represent rules of formation for expressions in the modeling language, and use them to examine validity of model declarations; and (4) embed and integrate multiple languages. This technique was applied to develop a prototype modeling system, now in use at the U.S. Coast Guard, for the rapid development, documentation, and use of a wide class of models. Dissert. Abstr.

N91-28770# North Carolina Univ., Chapel Hill. Dept. of Computer Science.

PROVIDING COMMON ACCESS MECHANISMS FOR DISSIMILAR NETWORK INTERCONNECTION NODES M.S. Thesis

JOHN MENGES Feb. 1991 105 p
 (Contract N00014-86-K-0680)
 (AD-A236630; TR91-013) Avail: NTIS HC/MF A06 CSCL 12/7

Over the past several years, thousands of Local Area Networks (LANs) around the world have been interconnected to form huge computer networks. These interconnections between LANs have been made using a variety of different classes of Interconnection Nodes (INs) made by many different vendors. Management of these essentially similar INs has been more difficult than necessary because of the dissimilar methods required to manage the various IN types. The design and implementation is described of access mechanisms that make it possible to manage the similar aspects of the various IN types in a common manner, without sacrificing the type-specific functions of the various proprietary management systems. GRA

N91-29075# Virginia Polytechnic Inst. and State Univ., Blacksburg.

A FRAMEWORK FOR DATA AND INFORMATION
 D. S. BERUBE, H. A. KURSTEDT, JR., and R. M. JONES 1991 3 p
 (Contract DE-FG02-88DP-48058)
 (DE91-012416; DOE/DP-48058/T12) Avail: NTIS HC/MF A01

The design information systems is still very much an art. Information systems are designed by looking at the characteristics of information, decisions, and the manager. For information system design to move from an art to a science, a detailed understanding of data, information, and the process by which data become information is needed. Information systems are failing because

system designers and operators don't have enough detailed understanding of data, information, and the data-to-information process to satisfy managers' information needs. There currently are no comprehensive frameworks that define data and information in enough detail to describe the data-to-information process. Worse, there's generally confusion about the terms data and information, and the two terms are often used interchangeably. Upon close examination of the literature, definitions and relationships are found that each serve to describe a portion of the data-to-information process. By assembling these definitions and relationships, a framework is developed to describe the data, information, and the relationships between data and information. DOE

N91-29083 Cleveland State Univ., OH.
THE DESIGN OF A CLINICAL LABORATORY INFORMATION SYSTEM Ph.D. Thesis

JOSEPH CHUNGWAN SU 1990 354 p
 Avail: Univ. Microfilms Order No. DA9113974

The design of a truly distributed clinical laboratory information management system based on the use of personal computers in a bus-type local area network is presented. The system-wide file management system will allow the efficient access of data stored in one computer by any other computer on the network. Functions of this system such as test requests, accession number generation, instrument loading list generation and drawlist generation will be very versatile. Dissert. Abstr.

N91-29084 Glasgow Univ. (Scotland).
INFORMATION MANAGEMENT: A UNIFORM CONCEPTUAL MODEL AND ITS USER INTERFACE Ph.D. Thesis

SUNDAY OLUSEGUN OJO 1985 272 p
 Avail: Univ. Microfilms Order No. BRD91907

Some existing approaches to conceptual data modeling are reviewed. A conceptual modeling framework is developed which is based on the idea of conceptual semantics in linguistics theory. This consists of a Conceptual Schema model, the syntactic embodiment of which is a Conceptual Schema specification language. This approach adopts the principle of Scheme unification which enables the orthogonal treatment of various aspects of information management. This principle was used as a means to achieving the goal of Schema reliability, evolvability, usability, and reliability. Dissert. Abstr.

N91-29086 Pennsylvania Univ., Philadelphia.
GENERALIZED HYPERTEXT IN A KNOWLEDGE-BASED DECISION SUPPORT SHELL ENVIRONMENT Ph.D. Thesis

MICHAEL PAUL BIEBER 1990 183 p
 Avail: Univ. Microfilms Order No. DA9112535

A decision support system (DSS) shell was developed serving DSS applications in a broad range of fields, such as finance, engineering and manufacturing. The shell uses a hypertext-style, direct manipulation interface for structuring and presenting information. To overcome the manual, static nature traditionally associated with hypertext, generalized hypertext was developed (an extension of standard hypertext to a dynamic, knowledge-based environment). Hypertext was viewed as system-level functionality, and available to all shell applications. In developing generalized hypertext, three of the outstanding hypertext research issues had to be solved: managing virtual hypertext entities, performing computation over a hypertext network during link traversal, and tailoring the hypertext network. Dissert. Abstr.

N91-29391# National Inst. of Standards and Technology, Gaithersburg, MD.

CONFIGURATION MANAGEMENT CONCEPTS DOCUMENT. NATIONAL PDES TESTBED REPORT SERIES

S. B. KATZ Apr. 1991 33 p
 (PB91-194480; NISTIR-4538) Avail: NTIS HC/MF A03 CSCL 13/2

The purpose is to establish Configuration Management (CM) concepts to be applied in support of the development of the Standard for the Exchange of Product Model Data (STEP). Configuration management is the management of change. It is a

formal discipline which provides methods and tools to: identify components, versions and baselines of selected items; and control changes to those items. CM provides a method for logically grouping related components throughout the various stages of product development. It also provides visibility and traceability for the evolving status of each item. An effective CM system thus identifies, controls, records, and reports on any functional, physical or status changes to the controlled items. Author

N91-29758# Army Construction Engineering Research Lab., Champaign, IL.

THE PC DUGOUT MICRO-MAINFRAME INTEGRATION SYSTEM: PAX IMPLEMENTATION Final Report

EDWARD J. JAPPEL, J. R. MURPHY, WAYNE J. SCHMIDT, and CONNIE L. RAAAYMAKERS May 1991 51 p (AD-A237480; CERL-TR-P-91/34) Avail: NTIS HC/MF A04 CSDL 12/5

This report describes the research and development of PC Dugout, a transparent software application for the distribution and control of applications on the Programming, Administration, and Execution (PAX) system. PC Dugout is designed to aid in the productive use of personal computers connected to PAX. The program enables previously centralized processing tasks to be distributed to personal computers, resulting in lower operating costs and improved user interfaces. PC Dugout automatically distributes and maintains personal computer applications developed to support the Military Construction, Army program. The design of PC Dugout addresses the challenge of providing an efficient, reliable method for distributing and updating PC applications while exercising an effective level of system management for a group of users that constantly changes and possesses varying degrees of computer proficiency. PC Dugout employs a menu interface, takes advantage of the PC interface with which new Dugout users are already familiar, and transparently manages tasks for multiuser applications. GRA

N91-29790# Illinois Univ., Urbana. Center for Reliable and High-Performance Computing.

PERFORMANCE IMPLICATIONS OF SYNCHRONIZATION SUPPORT FOR PARALLEL FORTRAN PROGRAMS

SADUN ANIK and WEN-MEI W. HWU 17 Jun. 1991 47 p (AD-A238493; UILU-ENG-91-1231; CRHC-91-21) Avail: NTIS HC/MF A03 CSDL 12/7

This paper studies the performance implications of architectural synchronization support for automatically parallelized numerical programs. As the basis for this work, we analyze the needs for synchronization in automatically parallelized numerical programs. The needs are due to task management, loop scheduling, barriers, and data dependency handling. We present synchronization algorithms for efficient execution of programs with nested parallel loops. Next, we identify how various hardware synchronization primitives can be used to satisfy these software synchronization needs. The synchronization primitives studied are test and set, fetch and add, exchange-byte and synchronization bus implementation of lock/unlock operations. Lastly, we ran experiments to quantify the impact of various architectural support on the performance of a bus-based shared memory multiprocessor running automatically parallelized numerical programs. We found that supporting an atomic fetch and add primitive in shared memory is as effective as supporting lock/unlock operations with a synchronization bus. Both achieve substantial performance improvement over the cases where atomic test and set and exchange-byte operations are supported in shared memory. GRA

N91-29818# New Mexico State Univ., Las Cruces. Computing Research Lab.

PROCEEDINGS OF THE 1ST WORKSHOP ON PROXIMITY GRAPHS Report, 1 Dec. 1989 - 31 May 1991

DONALD W. DEARHOLT and FRANK W. HARARY 31 May 1991 198 p Workshop held in Las Cruces, NM, 30 Nov. - 2 Dec. 1989

(Contract N00014-90-J-1323; NSF CCR-89-18729) (AD-A237250; CRL-MCCS-91-224) Avail: NTIS HC/MF A09 CSDL 12/1

The motivations for holding this workshop came from the recently discovered associations between proximity graphs and Pathfinder networks. The elegant theoretical domain and the breadth of applications make this a very rich area indeed. The workshop was attended by several of the leading researchers in proximity graphs, and was organized so that there would be adequate opportunity for discussion of common interests. The presentation was organized into four sections: theoretical foundations, algorithms and computational aspects, applications, and graphics and unsolved problems. There were also demonstrations of three systems based on proximity graphs: information retrieval using Pathfinder networks, a robotic vision database system organized as a monotonic search network, and a UNIX help system on a Hypertext Browser organized as a Pathfinder network. A tool to display and manipulate large graphs was also demonstrated. The workshop brought together some mainstream graph theorists and the researchers who had been working on proximity graphs as a special case of graph theory, and the interchange was profitable for all. GRA

N91-30055# Environmental Protection Agency, Washington, DC. Office of Information Resources Management.

INFORMATION SYSTEMS INVENTORY (ISI)

May 1991 246 p

(PB91-172940) Avail: NTIS HC/MF A11 CSDL 05/2

A hardcopy version of the EPA Information Systems Inventory (ISI) data base is presented. The ISI data base is maintained on an IBM PC and an Apple Macintosh and currently holds roughly 500 records. The ISI was developed to enhance the Agency's ability to track major information systems, facilitate the sharing of information across media and program boundaries and improve the Agency's oversight of information systems development. For each system in the Inventory, the following information is included: system identification, descriptors of data base content, and administrative data about access and legal authorities. Author

N91-30057# Sandia National Labs., Albuquerque, NM.

RECORDS MANAGEMENT AT THE DOE NATIONAL LABORATORIES: SANDIA NATIONAL LABORATORIES

N. J. PRUETT 1991 5 p Presented at the 1991 Nuclear Information and Records Management Association (NIRMA) Symposium, Charlotte, NC, 25-28 Aug. 1991

(Contract DE-AC04-76DP-00789)

(DE91-015563; SAND-91-1581C; CONF-9108113-1) Avail: NTIS HC/MF A01

Sandia National Laboratories is a large multi-program DOE laboratory. The Recorded Information Management Division (RIM) has an expanding mission to meet Sandia's needs for cost-effective management in information from creation to final disposition in accordance with applicable regulations and requirements. An analysis based on the need to meet requirements and to improve business practice was successful in convincing management to allocate increased resources to the RIM Compliance Project. DOE

N91-30361# Los Alamos National Lab., NM.

HIGH PERFORMANCE COMPUTING AND COMMUNICATIONS: INVESTMENT IN AMERICAN COMPETITIVENESS

15 Mar. 1991 296 p Prepared in cooperation with Gartner Group, Inc., Stamford, CT

(Contract W-7405-ENG-36)

(DE91-010975; LA-SUB-91-1) Avail: NTIS HC/MF A13

This report presents the results of a study performed by Gartner Group, Inc. for the U.S. Department of Energy (DOE), through a contract with the Los Alamos National Laboratory (LANL). The purpose of the study is to estimate the economic impact of the Federal High Performance Computing and Communications (HPCC) Program which was proposed by the Office of Science and Technology Policy (OSTP), Executive Office of the President, on September 8, 1989. That Program is an implementation of the

Research and Development Strategy for High Performance Computing, which was transmitted to Congress by OSTP on November 20, 1988. The objective of this Gartner Group study to provide an assessment of the likely economic impact and benefits of the Federal HPCC Program and the risks of non-support of this program. The goals of the HPCC Program are to: support computational advances through R and D effort; Reduce uncertainties to industry through increased cooperation and continued use of government as a market for High Performance Computing (HPC) prototypes; Support underlying research, network, and computational infrastructures; and support the U.S. human resource base. DOE

N91-30592*# Commerce Energy NASA NLM Defense Information Cataloging Committee, Oak Ridge, TN.

DATA POLICY AND AVAILABILITY SUPPORTING GLOBAL CHANGE RESEARCH, DEVELOPMENT, AND DECISION-MAKING: AN INFORMATION PERSPECTIVE

BONNIE C. CARROLL, ROBERT F. JACK, and GLADYS A. COTTER (National Aeronautics and Space Administration, Washington, DC.) Oct. 1990 15 p
(NASA-TM-105137; NAS 1.15:105137) Avail: NTIS HC/MF A03 CSCL 13/2

An explosion of information has created a crisis for today's information age. It has to be determined how to use the best available information sources, tools, and technology. To do this it is necessary to have leadership at the interagency level to promote a coherent information policy. It is also important to find ways to educate the users of information regarding the tools available to them. Advances in technology resulted in efforts to shift from Disciplinary and Mission-oriented Systems to Decision Support Systems and Personalized Information Systems. One such effort is being made by the Interagency Working Group on Data Management for Global Change (IAWGDMGC). Five federal agencies - the Department of Commerce (DOC), Department of Energy (DOE), National Aeronautics and Space Administration (NASA), National Library of Medicine (NLM), and Department of Defense (DOD) - have an on-going cooperative information management group, CENDI (Commerce, Energy, NASA, NLM, and Defense Information), that is meeting the challenge of coordinating and integrating their information management systems. Although it is beginning to be technically feasible to have a system with text, bibliographic, and numeric data online for the user to manipulate at the user's own workstation, it will require national recognition that the resource investment in such a system is worthwhile, in order to promote its full development. It also requires close cooperation between the producers and users of the information - that is, the research and policy community, and the information community. National resources need to be mobilized in a coordinated manner to move people into the next generation of information support systems. Author

N91-30741*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.

SPAN SECURITY POLICIES AND GUIDELINES

PATRICIA L. SISSON (Science Applications Research, Lanham, MD.) and JAMES L. GREEN 24 Oct. 1989 61 p
(NASA-TM-105071; NSSDC/WDC-A-R/S-89-21; NAS 1.15:105071) Avail: NTIS HC/MF A04 CSCL 09/2

A guide is provided to system security with emphasis on requirements and guidelines that are necessary to maintain an acceptable level of security on the network. To have security for the network, each node on the network must be secure. Therefore, each system manager, must strictly adhere to the requirements and must consider implementing the guidelines discussed. There are areas of vulnerability within the operating system that may not be addressed. However, when a requirement or guideline is discussed, implementation techniques are included. Information related to computer and data security is discussed to provide information on implementation options. The information is presented as it relates to a VAX computer environment. Author

N91-30786# National Aerospace Lab., Amsterdam (Netherlands). Informatics Div.

METHOD MANAGEMENT FOR THE BENEFIT OF LARGE SOFTWARE PACKAGES FOR ANALYSIS IN CAE

J. J. SCHUURMAN, J. H. MEELKER, and A. KASSIES 23 Jan. 1989 19 p Presented at Conference on Computer Applications in Production and Engineering, Amsterdam, Netherlands, 9-11 May 1989 Sponsored in part by Dutch Ministries of Education and Sciences, and Dutch Ministry of Transport and Public Work (NLR-TP-89027-U; ETN-91-99634; AD-B153481L) Avail: NTIS HC/MF A03

The application of MEBAS, a Method Base System designed to support the type of management of software components mentioned below, is illustrated for a large software package for flow analysis. The design and development of information systems for digital simulation in Computer Aided Engineering (CAE) is a continuous activity, following the development of mathematical models and numerical techniques. The resulting incremental development of information systems poses stringent requirements on the management of software configurations. In addition to the traditional management of source code in program libraries, it was proved to be necessary to manage software components in terms of their function, their implementation, and their relation to other software components. In this way, software components can be used consistently in different configurations. ESA

N91-30983*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.

SPACE PHYSICS ANALYSIS NETWORK NODE DIRECTORY (THE YELLOW PAGES): FOURTH EDITION

DAVID J. PETERS, PATRICIA L. SISSON, JAMES L. GREEN, and VALERIE L. THOMAS Aug. 1989 102 p
(NASA-TM-105068; NSSDC/WDC-A-R/S-89-14; NAS 1.15:105068) Avail: NTIS HC/MF A06 CSCL 05/1

The Space Physics Analysis Network (SPAN) is a component of the global DECnet Internet, which has over 17,000 host computers. The growth of SPAN from its implementation in 1981 to its present size of well over 2,500 registered SPAN host computers, has created a need for users to acquire timely information about the network through a central source. The SPAN Network Information Center (SPAN-NIC) an online facility managed by the National Space Science Data Center (NSSDC) was developed to meet this need for SPAN-wide information. The remote node descriptive information in this document is not currently contained in the SPAN-NIC database, but will be incorporated in the near future. Access to this information is also available to non-DECnet users over a variety of networks such as Telenet, the NASA Packet Switched System (NPSS), and the TCP/IP Internet. This publication serves as the Yellow Pages for SPAN node information. The document also provides key information concerning other computer networks connected to SPAN, nodes associated with each SPAN routing center, science discipline nodes, contacts for primary SPAN nodes, and SPAN reference information. A section on DECnet Internetworking discusses SPAN connections with other wide-area DECnet networks (many with thousands of nodes each). Another section lists node names and their disciplines, countries, and institutions in the SPAN Network Information Center Online Data Base System. All remote sites connected to US-SPAN and European-SPAN (E-SPAN) are indexed. Also provided is information on the SPAN tail circuits, i.e., those remote nodes connected directly to a SPAN routing center, which is the local point of contact for resolving SPAN-related problems. Reference material is included for those who wish to know more about SPAN. Because of the rapid growth of SPAN, the SPAN Yellow Pages is reissued periodically. J.P.S.

N91-30998# German National Research Center for Computer Science, Washington, DC.

PROMOTION OF INFORMATION TECHNOLOGY RESEARCH: GERMAN AND EUROPEAN STRATEGIES. PROCEEDINGS OF A FORUM AT THE EMBASSY OF THE FEDERAL REPUBLIC OF GERMANY

WOLFGANG TOELLE 1991 91 p Forum held in Washington, DC, 24 Jan. 1991
(PB91-188300) Avail: NTIS HC/MF A05 CSCL 05/2

The following subject areas are covered: GMD's research program and commitment to international IT research cooperation and transfer; the promotion of information technology research by the German government; European R and D in information technology. Author

N91-30999# Federal Library and Information Center Committee, Washington, DC.

PROCEEDINGS OF THE FEDERAL PRE-WHITE HOUSE

CONFERENCE ON LIBRARY AND INFORMATION SERVICES

Nov. 1990 122 p Conference held in Washington, DC, 26-27 Nov. 1990

(PB91-183558) Avail: NTIS HC/MF A06 CSCL 05/2

In 1987, the Federal information community began its work toward full participation in the 2nd White House Conference on Library and Information Services (WHCLIS II). Federal librarians and information specialists organized a Federal Library and Information Center Committee (FLICC) Task Force for WHCLIS II. After reviewing the recommendations from WHCLIS I (1979), several main areas of continuing concern were identified: access, networking, preservation, and funding. These core national issues were addressed under the umbrella of: equal opportunity of access to Federal information. Another important outcome of the preconference was the identification of an agenda for FLICC's long range plans for Federal library and information development, including the determination of how Federal library and information center resources and services must be developed or expanded to meet agency and citizen needs. Author

N91-31003 Physics and Electronics Lab. TNO, The Hague (Netherlands).

DATA FUSION: A PRELIMINARY STUDY Final Report

A. P. KEENE and M. PERRE Dec. 1990 58 p

(FEL-90-B356; TD-90-4515; ETN-91-99817) Copyright Avail: Physics and Electronics Lab. TNO, P.O. Box 96864, 2509 JG The Hague, Netherlands

Military intelligence processing is an increasingly complex domain, due to the incorporation of data from multiple sensors. The information is distributed in space and time and is subject to uncertainty and incompleteness. The process of combining multi-sensor data into a model of the domain of interest is known as data fusion. Initial insight into the ground that has to be covered by a system that will support data fusion is outlined. Tasks associated with intelligence processing are reviewed. Several views on data fusion are discussed. Various methods and techniques from the areas of databases, artificial intelligence and probability theory that may provide solutions for dealing with some of the problems pertaining to multi-sensor data fusion are presented. ESA

N91-31762# Manchester Univ. (England). School of Management.

DEVELOPMENTS IN MEDICAL AUDIT IN HOSPITALS IN THE NATIONAL HEALTH SERVICE M.S. Thesis

M. DJUMIC 1990 214 p

(ETN-91-99984) Copyright Avail: NTIS HC/MF A10

The current work on establishing comprehensive medical audit, focusing in particular on the role of information systems in the development of medical audit, the problems with outcome measurement, the perceived implications of medical audit for clinical freedom and the relationship of the activity to other reforms affecting the NHS (National Health Service, United Kingdom), is reviewed. In addition to a comprehensive review of the literature on medical audit, the study involved interviews with clinicians and management staffs. ESA

N91-31994 Politecnico di Milano (Italy). Lab. di Calcolatori.

THE DESIGN OF AN INTEGRITY CONSISTENCY CHECKER (ICC) FOR AN OBJECT ORIENTED DATABASE SYSTEM

CHRISTINE DELCOURT (GIP Altair, France) and ROBERTO

ZICARI 29 Nov. 1990 28 p

(REPT-91-021; ETN-91-99767) Avail: Politecnico di Milano, Piazza Leonardo da Vinci 32, 20133 Milan, Italy

Schema evolution is an important facility in object oriented databases. Updates should not result in inconsistencies either in the schema or in the database. A tool called ICC, which ensures the structural consistency when updating an object oriented database system is presented. The tool is implemented to evaluate the correctness of schema updates for the O2 object oriented database system. ESA

N91-31995 Politecnico di Milano (Italy). Dipartimento di Elettronica.

HYPERTEXT DEVELOPMENT USING A MODEL-BASED APPROACH

ANDREA CALOINI, FRANCA GARZOTTO, PAOLO PAOLINI, and DANIEL SCHWABE (Pontificia Univ Catolica, Rio de Janeiro Brazil) 1990 42 p Sponsored in part by Instituto de Pesquisas Espaciais

(REPT-90-074; ETN-91-99515) Avail: Politecnico di Milano, Piazza Leonardo da Vinci 32, 20133 Milan, Italy

Hypertext development is still for the most part at the handcrafting level, where each hypertext document must be hand designed. A compiler which takes hyperdocuments designed using a model based approach and generates stacks executable in HyperCard is presented. This compiler is implemented in standard SQL over a relational database representation of a hyperdocument designed using the Hypermedia Design Model (HDM). The compiling approach, even though illustrated with HDM, can be used with any structures design methodology. ESA

N91-32377# Tecnologica S.A., La Laguna (Spain).

SPACE FLIGHT COMPONENTS DATABASE [BASE DE DONNEES POUR COMPOSANTS HAUTE FIABILITE]

JOSE M. GALDO and JOSE A. IZQUIERDO /n ESA, ESA Electronic Components Conference p 545-547 Mar. 1991 In SPANISH

Copyright Avail: NTIS HC/MF A25; EPD, ESTEC, Noordwijk, Netherlands, HC 90 Dutch guilders

A space flight components data base is described. The data base included information on high fidelity components not found in manufacturers' data books. Technological data, component description, specifications and radiation tolerance of high fidelity components are included in the data base. Qualification status, flight histories, evaluation results, failure analysis and other quality related data are included. Commercial aspects such as delivery time and manufacturer information are presented. ESA

N91-32669*# Alabama Univ., Huntsville.

ADVANCED VISUALIZATION TECHNIQUES

MIKE BOTTS /n NASA. Marshall Space Flight Center, NASA/MSFC FY91 Global Scale Atmospheric Processes Research Program Review p 25-27 Sep. 1991

Avail: NTIS HC/MF A05 CSCL 09/2

The scientific computing needs of the Earth Science and Application Division (ESAD) were evaluated, and it was determined whether the existing visualization environment provides the proper tools for meeting those needs. Some of the deficiencies were corrected using off-the-shelf software. The following subject areas are covered: (1) evaluation of visualization environment at ESAD; (2) definition of science needs; (3) evaluation of available software/hardware; and (4) definition of software development environment. Author

N91-32817*# Research Inst. for Advanced Computer Science, Moffett Field, CA.

SAVING ALL THE BITS

PETER J. DENNING 15 Oct. 1990 15 p Submitted for publication

(Contract NCC2-387)

(NASA-CR-188879; NAS 1.26:188879; RIACS-TR-90-44) Avail: NTIS HC/MF A03 CSCL 09/2

The scientific tradition of saving all the data from experiments

for independent validation and for further investigation is under profound challenge by modern satellite data collectors and by supercomputers. The volume of data is beyond the capacity to store, transmit, and comprehend the data. A promising line of study is discovery machines that study the data at the collection site and transmit statistical summaries of patterns observed. Examples of discovery machines are the Autoclass system and the genetic memory system of NASA-Ames, and the proposal for knowbots by Kahn and Cerf. Author

N91-32819*# Research Inst. for Advanced Computer Science, Moffett Field, CA.

BEYOND FORMALISM

PETER J. DENNING 17 Jan. 1991 12 p

(Contract NCC2-387)

(NASA-CR-188886; NAS 1.26:188886; RIACS-TR-91-04) Avail: NTIS HC/MF A03 CSCL 09/2

The ongoing debate over the role of formalism and formal specifications in software features many speakers with diverse positions. Yet, in the end, they share the conviction that the requirements of a software system can be unambiguously specified, that acceptable software is a product demonstrably meeting the specifications, and that the design process can be carried out with little interaction between designers and users once the specification has been agreed to. This conviction is part of a larger paradigm prevalent in American management thinking, which holds that organizations are systems that can be precisely specified and optimized. This paradigm, which traces historically to the works of Frederick Taylor in the early 1900s, is no longer sufficient for organizations and software systems today. In the domain of software, a new paradigm, called user-centered design, overcomes the limitations of pure formalism. Pioneered in Scandinavia, user-centered design is spreading through Europe and is beginning to make its way into the U.S. Author

N91-32993# Air Force Inst. of Tech., Wright-Patterson AFB, OH. School of Systems and Logistics.

DEVELOPMENT OF A HANDBOOK FOR CONFIGURATION MANAGERS WITH APPLICATIONS FOR THE PROGRAM/SYSTEM IN FULL-SCALE DEVELOPMENT M.S. Thesis

JAMES E. CORBIN Sep. 1990 351 p
(AD-A229617; AFIT/GSM/LSY/90S-5) Avail: NTIS HC/MF A16 CSCL 05/1

This study resulted in the development of a Configuration Manager's Handbook that is intended to assist Air Force program offices and configuration management personnel apply the principles of configuration management to a product under development. The handbook can be used as a training document for in-coming personnel to a program office. It begins by briefly discussing the system acquisition life cycle as the domain in which a program is developed and the role of systems engineering in the development and design of the product. Configuration management is then introduced as a technical management control system that complements the technical actions undertaken during the systems engineering process. The handbook then proceeds to introduce, and in subsequent sections describe, the four processes that comprise configuration management: configuration identification, configuration audits, change management, and configuration status accounting. Finally, the uses of these processes for the program in full-scale development are discussed. This includes providing suggestions for the contents of Operating instructions that should be produced by configuration managers to describe the specific applications of configuration management principles within the program office, and of Statement of Work tasks that should be required of the contractor. GRA

06

RESEARCH AND DEVELOPMENT

Includes Contracts and Contract Management, Project Management, Program Management, Research Projects and Research Facilities, Scientific Research, Innovations and Inventions, Technology Transfer and Utilization, R & D Resources, Agency, National and International R & D.

A91-10115*# National Aeronautics and Space Administration, Washington, DC.

ADVANCED LIFE SUPPORT TECHNOLOGY DEVELOPMENT FOR THE SPACE EXPLORATION INITIATIVE

PEGGY L. EVANICH (NASA, Washington, DC), GERALD E. VOECKS, and P. K. SESHAN (JPL, Pasadena, CA) AIAA, Space Programs and Technologies Conference, Huntsville, AL, Sept. 25-27, 1990. 12 p.

(AIAA PAPER 90-3726) Copyright

An overview is presented of NASA's advanced life support technology development strategy for the Space Exploration Initiative. Three basic life support technology areas are discussed in detail: air revitalization, water reclamation, and solid waste management. It is projected that regenerative life support systems will become increasingly more complex as system closure is maximized. Advanced life support technology development will utilize three complementary elements, including the Research and Technology Program, the Regenerative Life Support Program, and the Technology Testbed Validations. L.K.S.

A91-10442

ACTIVITIES OF SELENIA SPAZIO

G. BIANCHI (Selenia Spazio S.p.A., Rome, Italy) Nuovo Cimento C, Serie 1 (ISSN 0390-5551), vol. 13 C, Jan.-Feb. 1990, p. 177-188.

Copyright

The history and current status of space R&D work at an Italian aerospace electronics firm are reviewed and illustrated with extensive photographs. Projects discussed include the data-processing systems for ESA scientific satellites (ESRO IV, COS-B, and Exosat), satellite communication systems (Italsat, Olympus, Sarit and SAT 2), the ESA Data Relay Satellite, and the ARGO satellite-based civil-defense and disaster-relief network. Consideration is given to the military programs SICRAL and Helios, the Meteosat and ERS-1 remote-sensing satellites, the functional electronics and crew-escape-module electrical system for Hermes, and the data-management and telecommunications system for Columbus. T.K.

A91-10970

A CASE STUDY IN FOSTERING INTERNATIONAL HSCT COLLABORATION

JAMES P. LOOMIS and ROBERT F. BESTGEN (Battelle Memorial Institute, Columbus, OH) IN: European Symposium on the Future of High Speed Air Transport, Strasbourg, France, Nov. 6-8, 1989, Proceedings. Toulouse, France, Cepadues-Editions, 1990, p. 231-236.

Copyright

The factors that led Battelle to establish its Center for High Speed Commercial Flight, the international inquiry phase, and the conclusions reached are presented. The characteristics and purposes of an international collaboration program that was defined and marketed, and how well this was received, are discussed. U.S. manufacturers, financial institutions, operators, and government institutions were provided with a joint forum as they pursued the possibilities of developing a commercially viable, environmentally acceptable high speed commercial transport. The Center's program and its outcome are described, along with the prospects for international collaboration. R.E.P.

06 RESEARCH AND DEVELOPMENT

A91-11472*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, OH.

A TECHNOLOGY ASSESSMENT OF ALTERNATIVE COMMUNICATIONS SYSTEMS FOR THE SPACE EXPLORATION INITIATIVE

DENISE S. PONCHAK, JOHN E. ZUZEK, WAYNE A. WHYTE, JR., RODNEY L. SPENCE, and PHILIP Y. SOHN (NASA, Lewis Research Center, Cleveland, OH) AIAA, Space Programs and Technologies Conference, Huntsville, AL, Sept. 25-27, 1990. 24 p. Previously announced in STAR as N90-27736. refs (AIAA PAPER 90-3681) Copyright

Telecommunications, Navigation, and Information Management (TNIM) services are vital to accomplish the ambitious goals of the Space Exploration Initiative (SEI). A technology assessment is provided for four alternative lunar and Mars operational TNIM systems based on detailed communications link analyses. The four alternative systems range from a minimum to a fully enhanced capability and use frequencies from S-band, through ka-band, and up to optical wavelengths. Included are technology development schedules as they relate to present SEI mission architecture time frames. Author

A91-14432#

NASP MATERIALS AND STRUCTURES AUGMENTATION PROGRAM (NMAP) OVERVIEW

NED NEWMAN (McDonnell Douglas Corp., Saint Louis, MO) AIAA, International Aerospace Planes Conference, 2nd, Orlando, FL, Oct. 29-31, 1990. 7 p. (AIAA PAPER 90-5206) Copyright

A status evaluation and organizational advantages assessment is conducted for the NASP Materials and Structures Augmentation Program (NMAP), which endeavors to coordinate the structural materials R&D efforts of all five NASP contractors in order to accelerate to development of the proof-of-concept X-30 research vehicle. Attention is given to the guiding principles of NMAP program management and its achievements to date in the development of SiC fiber-reinforced Ti-alloy matrix composites and monolithic titanium aluminide alloys, as well as in expediting technology transfer throughout the five primary contractors and their subcontractors. O.C.

A91-16712#

IMPLEMENTATION OF A SECURE MULTI-PROJECT LABORATORY FACILITY

DAVID M. DRAFFIN and JOHN S. BACHA (Boeing Integrated Technology Development Laboratories, Seattle, WA) IN: AIAA Flight Simulation Technologies Conference and Exhibit, Dayton, OH, Sept. 17-19, 1990, Technical Papers. Washington, DC, American Institute of Aeronautics and Astronautics, 1990, p. 284-292. refs (AIAA PAPER 90-3163) Copyright

A secure, multiproject facility named the Integrated Technology Development Laboratories (ITDL) has been built. This paper gives some background information on how the ITDL came into existence, along with methods developed to provide for security and laboratory operations. Some details are discussed on the types of resources that are shared between projects, the software design, the hardware design, the power and ground, the communications system, and the configuration management needed to support secure, rapid configuration changes. The facility organization and logistics are also outlined. Author

A91-16900* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, OH.

SPECULATING ON SPACE FUTURES

MARC G. MILLIS (NASA, Lewis Research Center, Cleveland, OH) Space Policy (ISSN 0265-9646), vol. 6, Nov. 1990, p. 353-356. Copyright

A volunteer group of engineers and scientists at NASA's Lewis Research Center is trying to push the frontiers of aerospace science and technology beyond the realm of conventional methods and concepts. The first step is to provide a supportive environment

for ideas that are too speculative or high risk to warrant formal organizational responsibility. This report describes the motivation, birth and experiences of this group. Author

A91-17699

U.S. SPACE RESEARCH PROGRAMS - FUTURE PROSPECTS

LOUIS J. LANZEROTTI (AT&T Bell Laboratories, Murray Hill, NJ) Aviation, Space, and Environmental Medicine (ISSN 0095-6562), vol. 61, Nov. 1990, p. 1052-1057.

Copyright

In this paper, some of the major space research activities which are planned to occur over the next few years are described together with some of the stresses affecting portions of the space research program. The causes of the stress include the trend toward large facilities (meaning that resources must, of necessity, be targeted into certain research directions), the fact that the perceived scientific possibilities exceed available resources, the effects of program delays and stretch-outs, and fewer opportunities for spaceflight experiments. Special attention is given to the procedures by which the aerospace research community decides to investigate the issues of biological and medical relevance in space and to the ways in which these research agenda mesh with those from other space research disciplines. I.S.

A91-19799*# National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.

TECHNICAL COMMUNICATIONS IN AEROSPACE - AN ANALYSIS OF THE PRACTICES REPORTED BY U.S. AND EUROPEAN AEROSPACE ENGINEERS AND SCIENTISTS

THOMAS E. PINELLI (NASA, Langley Research Center, Hampton, VA), REBECCA O. BARCLAY (Rensselaer Polytechnic Institute, Troy, NY), JOHN M. KENNEDY (Indiana University, Bloomington), and MYRON GLASSMAN (Old Dominion University, Norfolk, VA) International Professional Communication Conference, Guildford, England, Sept. 14, 1990, Paper. 8 p.

Results are reported from pilot surveys on the use of scientific and technical information (STI) by U.S. and NATO-nation aerospace scientists and engineers, undertaken as part of the NASA/DOD Aerospace Knowledge Diffusion Research Project. The survey procedures and the demographic characteristics of the 67 scientists and engineers who responded to the survey are summarized, and the results are presented in a series of tables and discussed in detail. Findings emphasized include: (1) both U.S. and NATO respondents spend around 60 percent of their work week producing or using STI products; (2) NATO respondents are more likely than their U.S. counterparts to use 'formal' STI products (like technical reports and papers) and the services of librarians and online data bases; (3) most of the respondents use computers and information technology in preparing STI products; and (4) respondents who had taken courses in technical communication agreed on the value and ideal subject matter of such courses. T.K.

A91-19803*# National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.

NASA/DOD AEROSPACE KNOWLEDGE DIFFUSION RESEARCH PROJECT

THOMAS E. PINELLI (NASA, Langley Research Center, Hampton, VA) and JOHN M. KENNEDY (Indiana University, Bloomington) American Society for Engineering Education, 1990 Annual Conference, Toronto, Canada, June 27, 1990, Paper. 19 p. refs

Descriptive and analytical data regarding the flow of aerospace-based scientific and technical information (STI) in the academic community are presented. An overview is provided of the Federal Aerospace Knowledge Diffusion Research Project, illustrating a five-year program on aerospace knowledge diffusion. Preliminary results are presented of the project's research concerning the information-seeking habits, practices, and attitudes of U.S. aerospace engineering and science students and faculty. The type and amount of education and training in the use of information sources are examined. The use and importance ascribed to various information products by U.S. aerospace faculty and students including computer and other information technology is assessed. An evaluation of NASA technical reports is presented

and it is concluded that NASA technical reports are rated high in terms of quality and comprehensiveness, citing Engineering Index and IAA as the most frequently used materials by faculty and students. L.K.S.

A91-19804*# National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.

AEROSPACE LIBRARIANS AND TECHNICAL INFORMATION SPECIALISTS AS INFORMATION INTERMEDIARIES - A REPORT OF PHASE 2 ACTIVITIES OF THE NASA/DOD AEROSPACE KNOWLEDGE DIFFUSION RESEARCH PROJECT
THOMAS E. PINELLI (NASA, Langley Research Center, Hampton, VA) and JOHN M. KENNEDY (Indiana University, Bloomington) Special Libraries Association, Annual Conference, 81st, Pittsburgh, PA, June 13, 1990, Paper. 15 p. refs

The flow of U.S. government-funded and foreign scientific and technical information (STI) through libraries and related facilities to users in government and industry is examined, summarizing preliminary results of Phase 2 of the NASA/DOD Aerospace Knowledge Diffusion Research Project (NAKDRP). The design and objectives of NAKDRP are reviewed; the NAKDRP model of STI transfer among producers, STI intermediaries, surrogates (technical report repositories or clearinghouses), and users is explained and illustrated with diagrams; and particular attention is given to the organization and operation of aerospace libraries. In a survey of North American libraries it was found that 25-30 percent of libraries regularly receive technical reports from ESA and the UK; the corresponding figures for Germany and for France, Sweden, and Japan are 18 and 5 percent, respectively. Also included is a series of bar graphs showing the librarians' assessments of the quality and use of NASA Technical Reports. T.K.

A91-21375*# National Aeronautics and Space Administration, Washington, DC.

INDUSTRY-UNIVERSITY COOPERATION/RESEARCH
RAYMOND P. WHITTEN (NASA, Commercial Development Div., Washington, DC) AIAA, Aerospace Sciences Meeting, 29th, Reno, NV, Jan. 7-10, 1991. 6 p.
(AIAA PAPER 91-0138) Copyright

The paper concentrates on the commercial development of space programs through cooperative research with the U.S. universities and industry. The origins of the programs are discussed, beginning with the Communication Satellite Act of 1963. The National Space Policy is outlined, and the creation of NASA's Office of Commercial Programs is emphasized, along with its Centers for the Commercial Development of Space. It is noted that the centers are consortia of university, industry, and government involved in commercial-space-technology database development and research and testing of potentially valuable products and services. The center titles, locations, and brief descriptions for such area of research as remote sensing, life sciences, materials processing, space power, space propulsion, materials and space structures, and automation and robotics centers are listed, along with some results of the programs. V.T.

A91-26060

ON INNOVATION, ERROR AND SPACE EXPLORATION

JESKO A. VON WINDHEIM (Guelph, University, Canada) Space Power - Resources, Manufacturing and Development (ISSN 0883-6272), vol. 9, no. 4, 1990, p. 323, 324.

Copyright

Exploration of space will pose one of the largest technological and scientific challenges for mankind in the 21st century. The success of space programs will largely depend on meeting these challenges as well as developing broadly based popular support for the objectives of these programs. In order to do this, a new approach must be taken to involve business, academia, industry, and the public more directly in the space program. Emphasis must be placed on improving access to space, reducing the bureaucracy involved with space research, and focusing on technology development that will have applications in space as well as on earth. Author

A91-26936

TECHNOLOGY TRANSFER IN MULTI-ORGANIZATIONAL ENVIRONMENTS - THE CASE OF R&D CONSORTIA

RAYMOND W. SMILOR and DAVID V. GIBSON (Texas, University, Austin) IEEE Transactions on Engineering Management (ISSN 0018-9391), vol. 38, Feb. 1991, p. 3-13. refs
Copyright

Research consortia represent a new organizational form which clarifies and highlights barriers and solutions to efficient and timely technology transfer. Using interview, archival, and survey data, it is suggested that four variables-communication, distance, equivocality, and motivation-are central to technology transfer processes within and between organizations. Managerial implications are presented in terms of a technology transfer grid which depicts different combinations of these variables. I.E.

A91-29087

RESEARCH MANAGEMENT TODAY

JOHN J. GILMAN (California, University, Berkeley) Physics Today (ISSN 0031-9228), vol. 44, March 1991, p. 42-48. refs
Copyright

While there are strong tendencies to homogenize organizations for administrative convenience, it is presently suggested that large, homogeneous research laboratories are as hampered in efforts to invent efficiently as large instrumental ensembles are in improvising music; in both cases, special internal structuring in the direction of smaller ensembles can markedly improve productivity. Small, informal groupings are noted to have persistently yielded research-innovation productivities well above those of their parent organization. The present meditation on research management gives attention to managing directors, who must function in ways analogous to those of orchestral conductors. O.C.

A91-29698#

RISK ASSESSMENT AND PROGRAM MANAGEMENT

JEROLD M. HABER IN: Aerospace Testing Seminar, 12th, Manhattan Beach, CA, Mar. 13-15, 1990, Proceedings. Mount Prospect, IL, Institute of Environmental Sciences, 1990, p. 31-38.

The application of risk-assessment (RA) methods to aerospace development programs is described and illustrated with extensive diagrams. The basic RA concepts are defined (hazard, exposure, vulnerability, and risk acceptability criteria); the analysis of a product development program in terms of the general environment and the contractor's work force, assets, and deliverables is explained; the construction of a risk estimation model is outlined; and different RA techniques are compared. A typical RA application involving a government procurement program with an artificially large number of risk sources is discussed in detail, with an emphasis on the value of RA for Total Quality Management. T.K.

A91-29723

THE SPACE SHUTTLE'S FAMILY TREE

RICHARD P. HALLION (USAF, Wright-Patterson AFB, OH) Air and Space (ISSN 0886-2257), vol. 6, Apr.-May 1991, p. 44-46.
Copyright

An overview is presented of the origin and development of the Space Shuttle and the significant part played by NASA, DOD and the U.S. aerospace industry in its evolution. NASA's civilian space applications were aimed toward designs with low lift-to-drag ratios such as lifting bodies and capsules, while the USAF missions were looking toward flyable spacecraft with greater lift capability. Phase A of the Shuttle's development began in 1968 when the Manned Spacecraft Center issued a joint request for proposal to study an Integral Launch and Reentry Vehicle System that could launch 50,000 lb payloads into orbits of at least 115 miles altitude. A model O40C called for new high-pressure engines to meet higher payload weights requested by the military; this model defined what eventually became the Shuttle. Phase B brought forth the concept of carrying hydrogen fuel in external tanks. A solid-fuel booster with a 13 ft diameter was developed as the candidate for the solid-fuel portion of the booster. Production of the Space Shuttle was begun in 1974 and OV-101, a test vehicle named Enterprise, was completed in September 1976. R.E.P.

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A91-29725

HOW TO SUCCEED IN BUSINESS WITHOUT REALLY FLYING
FRANK KUZNIK Air and Space (ISSN 0886-2257), vol. 6, Apr.-May 1991, p. 70-74.
Copyright

This review describes the conception and design of the Spacehab module positioned in the Space Shuttle's cargo bay that can be used as a pressurized laboratory for industrial experiments. The crew is able to handle the experiments by floating out of the middeck of the spacecraft and entering the laboratory through a connecting tunnel. Commercial experiments to be conducted focus on the areas of crystal growth, robotics, materials development, and pharmaceuticals. Depending on locker configuration, the module can transport two to three dozen experiments per flight. The complexities of forming the commercial enterprise to work with NASA for conducting commercial programs in space are described. R.E.P.

A91-29798*# NASA Scientific and Technical Information Facility, Baltimore-Washington International Airport, MD.

TECHNOLOGY TRANSFER AT NASA - A LIBRARIAN'S VIEW
RONALD L. BUCHAN (NASA, Scientific and Technical Information Facility, Baltimore, MD). IN: Technology transfer: The role of the sci-tech librarian. New York, Haworth Press, 1991, p. 49-57. refs

The NASA programs, publications, and services promoting the transfer and utilization of aerospace technology developed by and for NASA are briefly surveyed. Topics addressed include the corporate sources of NASA technical information and its interest for corporate users of information services; the IAA and STAR abstract journals; NASA/RECON, NTIS, and the AIAA Aerospace Database; the RECON Space Commercialization file; the Computer Software Management and Information Center file; company information in the RECON database; and services to small businesses. Also discussed are the NASA publications Tech Briefs and Spinoff, the Industrial Applications Centers, NASA continuing bibliographies on management and patent abstracts (indexed using the NASA Thesaurus), the Index to NASA News Releases and Speeches, and the Aerospace Research Information Network (ARIN). D.G.

A91-30665* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, AL.

NASA TECHNOLOGY - A NATIONAL PAYOFF

ISMAIL AKBAY (NASA, Marshall Space Flight Center, Huntsville, AL). IN: TABES 90 - Annual Technical and Business Exhibition and Symposium, 6th, Huntsville, AL, May 15, 16, 1990, Submitted Papers. Huntsville, AL, Huntsville Association of Technical Societies, 1990, p. 168-172.
(TABES PAPER 90-2105) Copyright

In June of 1989, a report was released by the Chapman Research Group, Inc., entitled 'An Exploration of Benefits from NASA Spinoff'. It explores the real benefits and applications of NASA technologies as reported in the annual NASA Spinoff publication and attempts to identify and quantify these benefits. The report recognizes that the Spinoff publication does not include all examples known, but provides a database from which a study can be made and conclusions reported. Conclusions from this report are summarized here. All steps taken by the federal government to enable potential users to have access to new technological ideas are covered as well as the mechanisms, such as the NASA Technology Utilization network and the Federal Laboratory Consortium, which opens doors to new technologies. Also, recent technology transfer agreements signed by the Marshall Center and several area state governments are discussed.

Author

A91-31372

WORK STARTS ON NORTH AMERICAN MOBILESATs

CHRIS BULLOCH Interavia Space Markets (ISSN 0258-4212), vol. 7, no. 2, 1991, p. 4-8, 10, 11.

Copyright

Companies in the United States and Canada have announced that they have succeeded in signing contracts for joint procurement

of two domestic mobile-service satellites. The aim is to provide travelers in North America with cellular-quality digital voice communications via public switched telephone networks no matter how remote their location. Various aspects of this project are discussed, including the number of subscribers, the procurement process, the satellite specification, and the launch arrangements.

B.J.

A91-34024

PREPARATORY PROGRAMS FOR THE INTERNATIONAL SPACE STATION UTILIZATION - EMPHASIS ON THE FRENCH PROGRAM

ALAIN ESTERLE and RICHARD BONNEVILLE (CNES, Paris, France) (Columbus VI - Symposium on Space Station Utilization, 6th, Bremen, Federal Republic of Germany, Apr. 24-26, 1990, Proceedings. A91-34016 13-12) Space Technology - Industrial and Commercial Applications (ISSN 0892-9270), vol. 11, no. 2, 1991, p. 103-108.

Copyright

Preparatory programs for the utilization of the International Space Station (ISS) and the Columbus laboratory are discussed, with special attention given to the differences between the parameters of the current project design and those of the presently available space systems including the Soviet systems. These differences are both quantitative (i.e., more diverse and ambitious objectives of the ISS) and qualitative (many new elements will be developed in parallel with the flight segment of the ISS). I.S.

A91-34113* National Technical Information Service, Springfield, VA.

CENDI - A STRATEGIC INTERAGENCY ALLIANCE IN THE 1990S

JOSEPH CAPONIO (DOC, National Technical Information Service, Springfield, VA), ELIZABETH BUFFUM (DOE, Office of Scientific and Technical Information, Oak Ridge, TN), GLADYS COTTER (NASA, Scientific and Technical Information Div., Washington, DC), KENT SMITH (National Library of Medicine, Bethesda, MD), and KURT MOLHOLM (DOD, Defense Technical Information Center, Alexandria, VA). Sci-Tech News (ISSN 0036-8059), vol. 45, April 1991, p. 6-15.

Copyright

The goals, functions, and accomplishments of the CENDI Group, a government interagency cooperative organization formed to improve federal research and development productivity and R&D information management systems through information exchange, are briefly reviewed. The five member agencies are the Departments of Commerce, Energy, Defense, and Health and Human Services, and NASA. CENDI provides a means for its members to share technologies, resources, ideas, information, management activities, and standards. The top priorities of CENDI are: work with R&D managers to improve productivity; provide technical data and information to all users; improve the effectiveness and efficiency of all CENDI agency operations; and familiarize R&D managers and policy makers with the value of STI. V.L.

A91-36351#

WRIGHT LABORATORY

ALAN S. BROWN (USAF, Wright Research and Development Center, Wright-Patterson AFB, OH). Aerospace America (ISSN 0740-722X), vol. 29, May 1991, p. 8-10.

Copyright

A review is presented of past and present aerospace research conducted at Wright Laboratory. Some of the advanced projects under study include turbines with twice the thrust/weight ratio of today's aircraft engines, flight helmets that reconstitute reality as a computer-enhanced simulation on their darkened inner walls, and hypersonic aircraft that fly from New York to Philadelphia in 90 seconds. The two major research programs being investigated are the National Aerospace Plane and the Integrated High-Performance Turbine Engine Technology effort, whose principal goal is to develop a flow of new technologies that can

be integrated into turbine design. Attention is given to the research and development of composite materials and the important role they play in all of these advanced projects. R.E.P.

A91-37930 National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.

POWER SYSTEM REQUIREMENTS AND DEFINITION FOR LUNAR AND MARS OUTPOSTS

D. A. PETRI (NASA, Johnson Space Center, Houston, TX), R. L. CATALDO, and J. M. BOZEK (NASA, Lewis Research Center, Cleveland, OH) IN: IECEC-90; Proceedings of the 25th Intersociety Energy Conversion Engineering Conference, Reno, NV, Aug. 12-17, 1990. Vol. 1. New York, American Institute of Chemical Engineers, 1990, p. 18-27.

Copyright

Candidate power systems being considered for outpost facilities (stationary power systems) and vehicles (mobile systems) are discussed, including solar, chemical, isotopic, and reactor. The current power strategy was an initial outpost power system composed of photovoltaic arrays for daytime energy needs and regenerative fuel cells for power during the long lunar night. As day and night power demands grow, the outpost transitions to nuclear-based power generation, using thermoelectric conversion initially and evolving to a dynamic conversion system. With this concept as a guideline, a set of requirements has been established, and a reference definition of candidate power systems meeting these requirements has been identified. I.E.

A91-38088* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, OH.

NASA AEROSPACE FLIGHT BATTERY SYSTEMS PROGRAM

MICHELLE A. MANZO and PATRICIA M. O'DONNELL (NASA, Lewis Research Center, Cleveland, OH) IN: IECEC-90; Proceedings of the 25th Intersociety Energy Conversion Engineering Conference, Reno, NV, Aug. 12-17, 1990. Vol. 3. New York, American Institute of Chemical Engineers, 1990, p. 85-89. Previously announced in STAR as N90-26397. refs

Copyright

The major objective of the NASA Aerospace Flight Battery Systems Program is to provide NASA with the policy and posture to increase and ensure the safety, performance and reliability of batteries for space power systems. The program plan has been modified in the past year to reflect changes in the agency's approach to battery related problems that are affecting flight programs. Primary attention in the Battery Program is being devoted to the development of an advanced nickel-cadmium cell design and the qualification of vendors to produce cells for flight programs. As part of a unified Battery Program, the development of a nickel-hydrogen standard and primary cell issues are also being pursued to provide high-performance NASA Standards and space qualified state-of-the-art primary cells. The resolution of issues is being addressed with the full participation of the aerospace battery community. Author

A91-41643#

TRENDS IN AIRCRAFT ENGINE MATERIALS

J. C. WILLIAMS (GE Aircraft Engines, Cincinnati, OH) AIAA, SAE, ASME, and ASEE, Joint Propulsion Conference, 27th, Sacramento, CA, June 24-26, 1991. 5 p.

(AIAA PAPER 91-1890) Copyright

The consequences of changing aircraft engine material requirements are discussed as well as various approaches taken to address these changes. A list of engine programs through 2005 is presented. It is suggested that a balanced allocation of resources between evolutionary, improved value, and revolutionary materials is necessary to retain the competitiveness of the airline industry. K.K.

A91-43036

A SERIES ON THE EUROPEAN COMMUNICATION SATELLITE PROGRAM. I - HISTORICAL BACKGROUND AND START OF THE TELECOM PROGRAMME

JOACHIM MUELLER (UN, Financial Services, Vienna, Austria)

Space Communications (ISSN 0924-8625), vol. 8, May 1991, p. 105-140. refs

Copyright

The evolution of the European Communication Satellite Program is examined for the period of 1964-1971 in the context of national activities focusing, on collaborative ventures as an alternative to national projects and government funding of communication satellite technology as compared with private initiatives. Topics discussed include policy-making at government level, project management by ESRO/ESA, and industrial implementation and system utilization. O.G.

A91-53240

AIAA TECHNICAL COMMITTEE ON MULTIDISCIPLINARY DESIGN OPTIMIZATION (MDO) - WHITE PAPER ON CURRENT STATE OF THE ART

Washington, DC, American Institute of Aeronautics and Astronautics, Jan. 15, 1991, 51 p. refs

Copyright

Multidisciplinary design optimization (MDO) is reviewed in terms of the need for technological integration, recent advances in the mathematically based MDO systems and methodologies, and directions for research and development. The use of MDO in the aerospace industry is first considered historically, and the multidisciplinary character of the design process is emphasized. Design considerations related to human interface and computing are set forth to underscore the essential nature of these aspects. In addressing the issues of aerospace design, the MDO approach relies primarily on sensitivity analyses and optimization methods. A list of ten characteristics of the concurrent engineering process is given, and each item is addressed in terms of the corresponding MDO contribution. MDO is essentially an environment in which human, mathematics, and computer factors can be effectively combined to make sound design decisions. C.C.S.

A91-55817

TOWN PLANNING FOR THE PACIFIC SPACE PORT

SHINJI MATSUMOTO, YASUHIRO KURODA, NOBUO ISOME, and KENJI TAKAGI (Shimizu Corp., Tokyo, Japan) IN: Space utilization and applications in the Pacific; Proceedings of the 3rd Pacific Basin International Symposium on Advances in Space Science Technology and its Applications, Los Angeles, CA, Nov. 6-8, 1989. San Diego, CA, Univelt, Inc., 1990, p. 167-174.

(AAS PAPER 89-619) Copyright

A Pacific spaceport (PS) concept is presented, focusing on function planning of the city. The city structure of the PS comprises research and business park structures, a PS management structure, and a world network structure. An international spaceport is viewed as a city which is constructed as the means of implementing various space projects. O.G.

A91-56215

AN INTERNATIONAL STUDENT COMPETITION IN AIR BREATHING ENGINE DESIGN AND DEVELOPMENT

C. M. EHRESMAN (Purdue University, West Lafayette, IN) IN: International Symposium on Air Breathing Engines, 10th, Nottingham, England, Sept. 1-6, 1991, Proceedings. Vol. 2. Washington, DC, American Institute of Aeronautics and Astronautics, 1991, p. 1075-1080.

Copyright

The pressure for increasing the performance of air-breathing engines and ever widening the operational envelopes has placed a premium on innovation and originality in problem solution. To this end the engineering educational systems in all countries of the world are charged with developing graduates who are not constrained by conventional or traditional approaches but rather ever seeking a better, more efficient, less costly way to solve problems facing the propulsion engineer. The objective of the current paper is formulation of a proposal for a method of encouraging among teachers and students; education, involvement and purposeful effort in creative activity in air-breathing engine technology through a competitive undertaking on a progressively structured institutional, national and international level. There are

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a number of paper competition programs involving the participation of students at both the undergraduate and graduate level in place. These are sponsored by educational institutions, industry, and engineering societies. These will be reviewed to evaluate their strong points and weaknesses. Many of these programs stress 'inventive application' to the solution system design problems. The competition should be expanded to address development problems including cycle analysis not necessarily related to a specific design. Author

A91-56372

A SERIES ON THE EUROPEAN COMMUNICATION SATELLITE PROGRAM. II - THE TELECOM PROJECT OTS. III - THE TELECOM PROGRAMME AND BEYOND

JOACHIM MUELLER (UN, Vienna, Austria) Space Communications (ISSN 0924-8625), vol. 8, July 1991, p. 221-294. refs

Copyright

Starting from the early activities in 1964, details are given on policy making at government level, project management by ESRO/ESA, industrial implementation, and system utilization. Particular attention is given here to the implementation of the Telecom project OTS up to 1975. Consideration is then given to the completion of the Telecom project ECS and the split in the joint European effort in 1979. A number of recent projects are also reviewed. O.G.

N91-10805# Federal Lab. Consortium, Washington, DC. PUTTING TECHNOLOGY TO WORK, 1990. EXAMPLES OF INDUSTRY-LABORATORY COOPERATION CONTRIBUTING TO OUR NATION'S ECONOMIC STRENGTH

Apr. 1990 94 p (PB90-215187) Avail: NTIS HC/MF A05 CSCL 05A

The report was compiled and produced by the Federal Laboratory Consortium, which works to improve and promote technology transfer by assisting businesses and others to identify the 'right' federal laboratory contacts in their fields of infrastructure for cooperation. The document is also a collection of examples from 14 laboratories representing 6 government agencies. A similar document was issued in 1988 and is available through the National Technical Information Service. Both sets of examples are indicative of the full potential for industry-laboratory cooperation to contribute to the nation's economic strength. GRA

N91-11132# Federal Railroad Administration, Washington, DC. Office of Research and Development.

INDUSTRY PERSPECTIVE ON MAGLEV Final Report

Jun. 1990 27 p Prepared in cooperation with Little (Arthur D.), Inc., Cambridge, MA (PB90-252305; DOT/FRA/ORD-90/07) Avail: NTIS HC/MF A03 CSCL 13H

Most of the recent discussion and proposed legislation concerning Maglev (magnetic levitation) assumes that U.S. industry has a strong interest in Maglev and will be willing to take a proactive, cost-sharing role in the development of Maglev systems. As part of the preliminary feasibility studies on Maglev, the Federal Railroad Administration obtained the perceptions of several major U.S. corporations and identified their interest in a Maglev program, their willingness to participate, and any potential barriers to their participation. The industry perspectives were obtained through an independent and unbiased external study that included in-depth interviews with senior executives from 22 major U.S. corporations. The study, conducted during April and May 1990, was primarily directed at the development and implementation of a next-generation leapfrog Maglev system in the United States. GRA

N91-11146# Helsinki Univ. of Technology, Espoo (Finland). ADVANCED SECONDARY BATTERIES: THEIR APPLICATIONS, TECHNOLOGICAL STATUS, MARKET AND OPPORTUNITY M. YAO (Yao International, Inc., Clarendon Hills, IL) Mar. 1989 138 p

(DE90-796146; NEMO-8) Avail: NTIS (US Sales Only) HC/MF A07

Program planning for advanced battery energy storage technology is supported within the NEMO Program. Specifically this study had focused on the review of advanced battery applications; the development and demonstration status of leading battery technologies; and potential marketing opportunity. Advanced secondary (or rechargeable) batteries have been under development for the past two decades in the U.S., Japan, and parts of Europe for potential applications in electric utilities and for electric vehicles. In the electric utility applications, the primary aim of a battery energy storage plant is to facilitate peak power load leveling and/or dynamic operations to minimize the overall power generation cost. In the application for peak power load leveling, the battery stores the off-peak base load energy and is discharged during the period of peak power demand. This allows a more efficient use of the base load generation capacity and reduces the need for conventional oil-fired or gas-fire peak power generation equipment. Batteries can facilitate dynamic operations because of their basic characteristics as an electrochemical device capable of instantaneous response to the changing load. Dynamic operating benefits results in cost savings of the overall power plant operation. Battery-powered electric vehicles facilitate conservation of petroleum fuel in the transportation sector, but more importantly, they reduce air pollution in the congested inner cities. DOE

N91-11593# Office of Technology Assessment, Washington, DC.

PROPOSAL PRESSURE IN THE 1980S: AN INDICATOR OF STRESS ON THE FEDERAL RESEARCH SYSTEM

J. ANDELIN and N. CARSON Apr. 1990 26 p (PB90-253147) Avail: NTIS HC/MF A03 CSCL 05A

The growing competition for research monies is discussed during a decade where R and D budgets increased in real terms. The significance of the competition for the allocation of Federal research funds in the 1990s is also discussed. GRA

N91-12098# Rolls-Royce Ltd., Derby (England).

THE DEVELOPMENT OF SCORPIO AS A COMMERCIAL PRODUCT

I. J. SHELLARD, C. BAXTER, and A. T. JONES 15 Jun. 1990 13 p (PNR-90746; ETN-90-97953) Copyright Avail: NTIS HC/MF A03

SCORPIO is an inspection system used in precision casting facilities to measure the orientation of the crystal axes with respect to the design axes within single crystal turbine components. The system is used in the production environment and as such operated either by production quality control personnel or totally robotically. The factors which created the need for SCORPIO and the history of its technical development, with focus on the effect that the decision to market the product commercially has had on the specification and the manner in which the project has progressed, are described. ESA

N91-12580# National Center for Advanced Technologies, Washington, DC.

THE PROSPECTS OF AERONAUTICS

J. M. SWIHART In AGARD, Seminar on the Structure of Aeronautical R/D 24 p May 1990

Copyright Avail: NTIS HC/MF A06; Non-NATO Nationals requests available only from AGARD/Scientific Publications Executive

When considering aeronautical research and development it is useful to begin by reviewing the prospects of aeronautics for the next decades. As is clear from the other papers, the participation in any major development in aeronautics requires a sustained effort of many years and so major contributions are considered, nationally or internationally, which will come to fruition in the next century. The 20th century saw the development of aeronautics on a global scale. The question is asked if this development now has levelled off and if from now on only marginal improvements and utilization will take place. It is indicated that

there will be tremendous challenges and opportunities in the coming decades. The essence of the 50th Wright Brothers Lecture, first given in St. Louis, Missouri, USA on 14 September 1987 is contained. The lecture concentrated on civil aeronautics, but of course many identical technical developments apply equally to military and civil aviation. In fact the history of aeronautical development shows that there is an intimate relationship between civil and military aeronautical developments. The developments since 1987, when the paper was written, suggest that the outlook for technical aeronautical developments has not become less and, in fact, the developments may far exceed the expectations of a few years ago. Author

N91-12582# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France).

AERONAUTICAL R AND D IN SMALLER COUNTRIES

JAN A. VANDERBLIEK *In its Seminar on the Structure of Aeronautical R and D* 15 p May 1990

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Aeronautics fulfills an important function in education (engineering sciences), industry, traffic and trade. It is quite often considered as a major factor in the economic future of a country, together with electronic computers, atomic energy (recently with more emphasis). This, combined with the necessity to maintain an effective air defense, makes it mandatory for industrially developing countries to evaluate carefully to what extent they want to invest in aeronautics and, more generally, in aerospace. The planning and organization of aeronautical research and development and its role in aeronautics in general are discussed. Special attention is given to the situation of smaller countries. The paper is to a large extent based on experiences gained in Canada, the USA and especially in the Netherlands. Although this experience may be only of limited direct use to industrially developing countries, it may assist in charting the course of those countries. Author

N91-12585# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).

PLANNING APPLIED RESEARCH IN FRANCE

A. AURIOL *In AGARD, Seminar on the Structure of Aeronautical R/D* 16 p May 1990

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The development of a new weapon system is a very expensive operation. The development process consists of fundamental research, prototype design; and operational testing of the prototype. The organization of the Ministry of Defense; features of armament and aeronautical research; structure of aeronautical industry and research; and the orientation and programming of applied research are outlined in order to understand the development process. B.G.

N91-12586# Messerschmitt-Boelkow-Blohm G.m.b.H., Brussels (Belgium).

INTERNATIONAL COOPERATION IN AERONAUTICAL RESEARCH AND DEVELOPMENT CARRIED OUT BY INTERNATIONAL ORGANISATIONS

JUERGEN H. WILD *In AGARD, Seminar on the Structure of Aeronautical R/D* 27 p May 1990

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The following subjects are addressed: objectives and structures of cooperative programs; review of cooperative schemes in research and development; description of programs and projects; funding systems schemes for research and technology cooperation; and the specific situation concerning research technology and development in Portugal, Greece, and Turkey. B.G.

N91-12722# Office of Technology Assessment, Washington, DC.

ACCESS TO SPACE: THE FUTURE OF US SPACE TRANSPORTATION SYSTEMS

May 1990 95 p

(PB90-253154; OTA-ISC-415) Avail: NTIS HC/MF A05; also available SOD HC \$4.75 as 052-003-01177-8 CSCL 22/1

The Nation's ability to explore space and use the opportunities it offers depends on having a fleet of versatile and reliable launch vehicles. This report, which summarizes the Office of Technological Assessments (OTA's) assessment of space transportation technologies, examines a wide range of potential improvements in safety, reliability, and performance for the Space Shuttle and our fleet of expendable launch vehicles. Decisions taken now will affect the future of spaceflight in the 21st century, when the Nation will need replacements for current launch systems. The report also explores the potential for advanced systems such as an advanced manned launch system, or a national aerospace plane, which could revolutionize access to space. GRA

N91-12824# Walcoff and Associates, Inc., Alexandria, VA.

POLYMER MATRIX COMPOSITES RESEARCH: A SURVEY OF FEDERALLY SPONSORED PROGRAMS

Jun. 1990 168 p

(Contract DE-AC01-89ER-30152)

(DE91-000453; DOE/ER-30152/H1T) Avail: NTIS HC/MF A08

This report identifies research conducted by agencies of the Federal government other than the Department of Energy (DOE) in the area of advanced polymer matrix composites (PMCs). DOE commissioned the report to avoid duplicating other agencies' efforts in planning its own research program for PMCs. PMC materials consist of high-strength, short or continuous fibers fused together by an organic matrix. Compared to traditional structural metals, PMCs provide greater strength and stiffness, reduced weight, and increased heat resistance. The key contributors to PMC research identified by the survey are the Department of Defense (DOD), the National Aeronautics and Space Administration (NASA), the National Science Foundation (NSF), and the Department of Transportation (DOT). The survey identified a total of 778 projects. More than half of the total projects identified emphasize materials research with a goal toward developing materials with improved performance. Although an almost equal number of identified materials projects focus on thermosets and thermoplastics, thermoplastics receive more attention because of their increased impact resistance, easy formability, and re-formability. Slightly more than one third of projects identified target structures research. Only 15 percent of the projects identified focus on manufacturing techniques, despite the need for efficient, economical methods of manufacturing products constructed of PMC's-- techniques required for PMC's to gain widespread acceptance. Three issues to be addressed concerning PMC's research are economy of use, improvements in processing, and education and training. Five target technologies have been identified that could benefit greatly from increased use of PMCs: aircraft fuselages, automobile frames, high-speed machinery, electronic packaging, and construction. DOE

N91-12880# Massachusetts Inst. of Tech., Cambridge. Research Lab. of Electronics.

RESEARCH PROGRAMS AT THE RESEARCH LABORATORY OF ELECTRONICS Progress Report No. 132, 1 Jan. - 31 Dec. 1989

JONATHAN ALLEN and DANIEL KLEPPNER 1990 374 p (AD-A225355) Avail: NTIS HC/MF A16 CSCL 14/2

The Research Laboratory of Electronics (RLE) was established in 1946 as the Institute's first interdepartmental laboratory. Originally organized under the joint sponsorship of the Departments of Physics and Electrical Engineering, RLE has broadened its interests to cover a wide range of research. The RLE environment provides both the freedom of action essential in an academic institution and the availability of large-scale laboratory facilities and services required by researchers. RLE's interdisciplinary setting offers many opportunities for creative and collaborative research. By fostering this powerful combination of research and education, RLE effectively penetrates beyond the horizon of new ideas and information. RLE Progress Report Number 132 describes research programs at RLE for the period January 1 through December 31,

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1989. Each chapter of the Progress Report contains both a statement of research objectives and a summary of research efforts for research projects listed. There are three appendices at the end of the report: Appendix A is a bibliography of RLE publications and papers presented by RLE staff during 1989; Appendix B is a roster of current RLE staff; and Appendix C is an index of RLE sponsors. GRA

N91-13051*# Research Inst. for Advanced Computer Science, Moffett Field, CA.

SPACE AND BIOTECHNOLOGY: AN INDUSTRY PROFILE

RICHARD S. JOHNSTON, DAVID J. NORTON, and BALDWIN H. TOM Nov. 1988 93 p
(Contract NCC9-16)
(NASA-CR-187034; NAS 1.26:187034) Avail: NTIS HC/MF A05 CSDL 06/3

The results of a study conducted by the Center for Space and Advanced Technology (CSAT) for NASA-JSC are presented. The objectives were to determine the interests and attitudes of the U.S. biotechnology industry toward space biotechnology and to prepare a concise review of the current activities of the biotechnology industry. In order to accomplish these objectives, two primary actions were taken. First, a questionnaire was designed, reviewed, and distributed to U.S. biotechnology companies. Second, reviews of the various biotechnology fields were prepared in several aspects of the industry. For each review, leading figures in the field were asked to prepare a brief review pointing out key trends and current industry technical problems. The result is a readable narrative of the biotechnology industry which will provide space scientists and engineers valuable clues as to where the space environment can be explored to advance the U.S. biotechnology industry. Author

N91-13347*# National Aeronautics and Space Administration, Washington, DC.

ISSUES IN NASA PROGRAM AND PROJECT MANAGEMENT

FRANCIS T. HOBAN, ed. Jul. 1990 57 p
(NASA-SP-6101(03); NAS 1.21:6101(03)) Avail: NTIS HC/MF A04 CSDL 05/1

This volume is the third in an ongoing series on aerospace project management at NASA. Articles in this volume cover the attitude of the program manager, program control and performance measurement, risk management, cost plus award fee contracting, lessons learned from the development of the Far Infrared Absolute Spectrometer (FIRAS), small projects management, and age distribution of NASA scientists and engineers. A section on resources for NASA managers rounds out the publication. Author

N91-13575*# National Aeronautics and Space Administration, Washington, DC.

MICROGRAVITY STRATEGIC PLAN, 1990

1990 26 p
(NASA-TM-103448; NAS 1.15:103448) Avail: NTIS HC/MF A03 CSDL 22/1

The mission of the NASA Microgravity program is to utilize the unique characteristics of the space environment, primarily the near absence of gravity, to understand the role of gravity in materials processing, and to demonstrate the feasibility of space production of improved materials that have high technological, and possible commercial, utility. The following five goals for the Microgravity Program are discussed: (1) Develop a comprehensive research program in fundamental sciences, materials science, and biotechnology for the purpose of attaining a structured understanding of gravity dependent physical phenomena in both Earth and non-Earth environments; (2) Foster the growth of interdisciplinary research community to conduct research in the space environment; (3) Encourage international cooperation for the purpose of conducting research in the space environment; (4) Utilize a permanently manned, multi-facility national microgravity laboratory in low-Earth orbit to provide a long-duration, stable microgravity environment; (5) Promote industrial applications of

space research for the development of new, commercially viable products, services, and markets resulting from research in the space environment. Y.S.

N91-15193# Deutsche Forschungsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (Germany, F.R.).

ORGANIZATION AND ACTIVITIES OF THE DLR

ROLF DICK /In ESA, Some Papers from the Seminar Mirando al Espacio p 5-10 Jun. 1990

Copyright Avail: NTIS HC/MF A05; EPD, ESTEC, Noordwijk, Netherlands, HC 30 Dutch guilders

The activities of the German aerospace research organization are described, including history, location of research centers, short discussion of the main tasks, astronautics and energy technology. The space activities include space vehicles, space applications, space missions, and space project management. Examples are given. ESA

N91-15202# Centro de Investigacion Cientifica y de Educacion Superior de Ensenada (Mexico).

THE SATLEX PROJECT

FRANCISCO JAVIERMENDIETAJIMENEZ /In ESA, Some Papers from the Seminar Mirando al Espacio p 51-52 Jun. 1990

Copyright Avail: NTIS HC/MF A05; EPD, ESTEC, Noordwijk, Netherlands, HC 30 Dutch guilders

A Mexican project on design and development of a low orbit satellite for telecommunications and scientific application is described. The preliminary activities concerning initial design and project planning are presented. The benefits of this project in terms of technology innovation and dissemination is stated. ESA

N91-16051*# Illinois Univ., Urbana-Champaign.

MISSION MANAGEMENT, PLANNING, AND COST: PULSE ATTITUDE AND CONTROL SYSTEMS (AACS)

/In its Aerospace Vehicle Design, Spacecraft Section. Volume 2: Project Groups 5-7 98 p May 1990
Avail: NTIS HC/MF A13 CSDL 22/2

The Pluto unmanned long-range scientific explorer (PULSE) is a probe that will do a flyby of Pluto. It is a low weight, relatively low costing vehicle which utilizes mostly off-the-shelf hardware, but not materials or techniques that will be available after 1999. A design, fabrication, and cost analysis is presented. PULSE will be launched within the first decade of the twenty-first century. The topics include: (1) scientific instrumentation; (2) mission management, planning, and costing; (3) power and propulsion systems; (4) structural subsystem; (5) command, control, and communication; and (6) attitude and articulation control. K.S.

N91-16257# Oak Ridge National Lab., TN.

MEETINGS TO SHARE ADVANCEMENTS IN HEAT PUMP TECHNOLOGIES

F. A. CRESWICK, R. C. DEVAULT, and P. D. FAIRCHILD Apr. 1990 25 p

(Contract DE-AC05-84OR-21400)

(DE90-010008; ORNL/FTR-3561) Avail: NTIS HC/MF A03

The Conference brought together researchers, engineers, managers, and government policy makers from the various participating countries and provided a forum to share information on heat pump technological advancements and related environmental issues. From interactions with the Japanese participants in various working meetings and site visits, it is clear that heat pumps represent a major technology emphasis in Japan for industry and utility supported R and D, as well as government sponsored programs. The Super Heat Pump (SHP) project sponsored by the Agency of Industrial Science and Technology (AIST), Ministry of International Trade and Industry (MITI) and aimed at leveling electric power demand in addition to higher heat pump performance, is a notable example of this emphasis and of the way in which industry, research institutes, and government are working together in Japan. A joint industry R and D association established for the SHP effort, for example, includes sixteen (16) major corporate members (Mitsubishi, Toshiba, etc.). Also, gas fired heat pumps have moved beyond laboratory prototypes and

field tests and have emerged in Japan in production quantities. These first market entry products use near conventional small I.C. engines and are sized for residential and small commercial building applications. Sales are already in the ten thousands annually, and are increasing. Four major companies are already manufacturing and marketing such units (Yamaha, Yanmar, Aisin Seiki, and Sanyo). The Japanese companies and research organizations were much more open and frank about their research activities and progress than anticipated. The new Heat Pump Technology Center of Japan (HPTCJ) was an excellent host and established a positive atmosphere for international dialogue and cooperation. DOE

N91-17050*# National Aeronautics and Space Administration, Washington, DC.

AVIONICS ADVANCED DEVELOPMENT STRATEGY

D. DYER *In its* Space Transportation Avionics Technology Symposium. Volume 2: Conference Proceedings p 675-686 Aug. 1990

Avail: NTIS HC/MF A99 CSCL 01/4

Discussed here is the problem of how to put together an integrated, phased, and affordable avionics advanced development program that links and applies to operational, evolving, and developing programs/vehicles, as well as those in the planning phases. Collecting technology needs from individual programs/vehicles and proposed technology items from individual developers usually results in a mismatch and something that is unaffordable. A strategy to address this problem is outlined with task definitions which will lead to avionics advanced development items that will fit within an overall framework, prioritized to support budgeting, and support the scope of NASA space transportation needs. Author

N91-17058*# National Aeronautics and Space Administration, Washington, DC.

SYSTEMS ENGINEERING AND INTEGRATION (SE AND I)

In its Space Transportation Avionics Technology Symposium. Volume 2: Conference Proceedings p 791-800 Aug. 1990

Avail: NTIS HC/MF A99 CSCL 22/2

Systems engineering and integration topics are presented in viewgraph form. Requirements, risk, redundancy, standards, costs, tests beds, and operations are covered. Author

N91-17120 Tennessee Univ., Knoxville.

DESIGN AND DEVELOPMENT OF A SPACE STATION HAZARDOUS MATERIALS INFORMATION SYSTEM FOR ASSESSING CHEMICAL COMPATIBILITY Ph.D. Thesis

RICHARD THOMAS CONGO 1990 293 p

Avail: Univ. Microfilms Order No. DA9030696

The need for and development of a modeling process which will perform chemical and material compatibility analyses for the Space Station Microgravity and Material Processing Facility (MMPF) is addressed. The modeling process includes development of a data base containing physical, chemical, toxicological, reactive, corrosive, and incompatibility properties for materials to be used in construction of the Space Station Freedom or in experiments to be conducted onboard. The underlying hypothesis of the modeling process is that by knowing the number of chemical incompatibilities, hazards, and corrosivities for any given facility or mission, one can modify or substitute chemicals for a facility or facility manifest to reduce the number of chemical incompatibilities, hazards, and corrosivities thus reducing the number of potential safety problems aboard the Space Station MMPF. The proposed process was developed into a computerized system with the aid of a relational data base and the development of application programs. An experiment was performed to validate the proposed model. This experiment consisted of utilizing the computerized system to identify the number of chemical incompatibilities, hazards and corrosivities for a given facility and a mission. The chemical requirements for the facility were modified utilizing substitute chemicals where appropriate, and the mission set was modified by replacing facilities with substitute facilities. The model was utilized to identify any reduction in the number of chemical incompatibilities, hazards, and corrosivities resulting from the

substitutions. The results of the study and the experiments establish both the process and the hypothesis to be accurate.

Dissert. Abstr.

N91-17175# Acurex Corp., Mountain View, CA. Environmental Systems Div.

COMBUSTION EXPERIMENTATION HANDBOOK Final Report, Aug. 1986 - Aug. 1988

CLEMENT I. OKOH and RICHARD A. BROWN 31 Aug. 1988 425 p

(Contract GRI-5086-234-1323)

(PB91-101923; GRI-88/0143) Avail: NTIS HC/MF A18 CSCL 21/2

The handbook covers test planning, diagnostic methods, data analysis techniques, and report writing. The handbook begins with sections on test planning issues including work plans, test plans, variable identification, sensitivity analysis, quality assurance, and figures of merit. This is followed by a discussion of diagnostic techniques including temperature, pressure, flow measurement, flow visualization, and emissions monitoring. The handbook also addresses data gathering and reduction techniques. Gathering of transient data is addressed, as is error analysis and data manipulation. Definitions of key variables and figures of merit that can be used to evaluate systems and experimental data are also provided. Author

N91-17811# National Science Foundation, Washington, DC. Div. of Science Resources Studies.

NATIONAL PATTERNS OF R AND D RESOURCES: 1990 Final Report

J. E. JANKOWSKI Apr. 1990 73 p

(PB90-259839; NSF-90-316) Avail: NTIS HC/MF A04 CSCL 05/1

The subject areas covered are: general notes to the reader; highlights; trends in national R and D support; measures and comparisons of national resources for R and D; national R and D performance patterns - by sector; national R and D performance patterns - by state; character of work; R and D scientists and engineers; and appendixes. Author

N91-17883*# National Aeronautics and Space Administration, Washington, DC.

THE ASTROPHYSICS PROGRAM AT THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA)

C. J. PELLERIN *In* ESA, Evolution in Astrophysics: IUE Astronomy in the Era of New Space Missions p 175-182 Aug. 1990

Copyright Avail: NTIS HC/MF A25; EPD, ESTEC, Noordwijk, Netherlands, HC 80 Dutch guilders CSCL 03/2

Three broad themes characterize the goals of the Astrophysics Division at NASA. These are obtaining an understanding of the origin and evolution of the universe, the fundamental laws of physics, and the birth and evolutionary cycle of galaxies, stars, planets and life. These goals are pursued through contemporaneous observations across the electromagnetic spectrum with high sensitivity and resolution. The strategy to accomplish these goals is fourfold: the establishment of long term space based observatories implemented through the Great Observatories program; attainment of crucial bridging and supporting measurements via missions of intermediate and small scope conducted within the Explorer, Spacelab, and Space Station Attached Payload Programs; enhancement of scientific access to results of space based research activities through an integrated data system; and development and maintenance of the scientific/technical base for space astrophysics programs through the research and analysis and suborbital programs. The near term activities supporting the first two objectives are discussed. ESA

N91-18169*# Purdue Univ., West Lafayette, IN.

DESIGN OF A HIGH SPEED BUSINESS TRANSPORT

In USRA, Proceedings of the 6th Annual Summer Conference: NASA/USRA University Advanced Design Program p 321-324 Nov. 1990

Avail: NTIS HC/MF A14 CSCL 01/3

The design of a High Speed Business Transport (HSBT) was considered by the Aeronautical Design Class during the academic year 1989 to 1990. The project was chosen to offer an opportunity to develop user friendliness for some computer codes such as WAVE DRAG, supplied by NASA/Langley, and to experiment with several design lessons developed by Dr. John McMasters and his colleagues at Boeing. Central to these design lessons was an appeal to marketing and feasibility considerations. There was an emphasis upon simplified analytical techniques to study trades and to stimulate creative thinking before committing to extensive analytical activity. Two designs stood out among all the rest because of the depth of thought and consideration of alternatives. One design, the Aurora, used a fixed wing design to satisfy the design mission: the Viero used a swept wing configuration to overcome problems related to supersonic flight. A summary of each of these two designs is given.

Author

N91-18206# European Space Agency, Paris (France).
SOME COMMENTS ON MULTILATERAL COOPERATION
In its Manned Space Stations: Their Construction, Operation and Potential Applications p 117-119 Nov. 1990
 Copyright Avail: NTIS HC/MF A06; EPD, ESTEC, Noordwijk, Netherlands, HC 40 Dutch guilders

The financing of manned space stations and the pros and cons of multilateral cooperation are discussed. Launching and operating these manned space stations is essentially a totally government funded venture, since no private company is prepared to invest in them until adequate revenues can be expected in the short term. However the government funded nature and very high costs involved means delays and budgetary cuts can seriously hinder and delay proceedings. When international cooperation is involved, for example the Space Station Freedom, one country's cut can seriously affect another country's budget. Naturally there are advantages to international cooperation from the scientific point of view since combining intellectual, technological, and economic resources allows advances to be made faster and more efficiently. It is stated that the need for every partner to receive 'reciprocal benefits' is the best formula for cooperation.

ESA

N91-19319*# National Aeronautics and Space Administration, Washington, DC.
MICROGRAVITY STRATEGIC PLAN, 1988
 Aug. 1988 25 p
 (NASA-TM-103397; NAS 1.15:103397) Avail: NTIS HC/MF A03 CSCL 22/1

The NASA agency-wide microgravity strategic plan is presented, and its research, applications, and commercialization for the 1990's is addressed. The plan presents an analysis of the current situation, identifies critical factors, and defines goals, objectives, and strategies, which are intended to: (1) provide a context for decision making; (2) assure realism in long-range planning and direction for hardware development; and (3) establish a framework for developing a national microgravity research plan.

Author

N91-19506# Oak Ridge National Lab., TN.
A SUMMARY OF THE STATUS OF BIOMASS CONVERSION TECHNOLOGIES AND OPPORTUNITIES FOR THEIR USE IN DEVELOPING COUNTRIES
 D. B. WADDLE, R. D. PERLACK, and J. WIMBERLY 1990
 12 p Presented at the 6th International Symposium on Agricultural and Food Processing Wastes (ISAFPW '90) Chicago, IL; 17-18 Dec. 1990
 (Contract DE-AC05-84OR-21400)
 (DE91-006341; CONF-901269-1) Avail: NTIS HC/MF A03

Biomass plays a significant role in energy use in developing countries; however, these resources are often used very inefficiently. Recent technology developments have made possible improved conversion efficiencies for utility scale technologies. These developments may be of interest in the wake of recent policy changes occurring in several developing countries, with respect to independent power production. Efforts are also being directed at developing biomass conversion technologies that can interface and/or compete with internal combustion engines for

small, isolated loads. The technological status is reviewed of biomass conversion technologies appropriate for commercial, industrial, and small utility applications in developing countries. Market opportunities, constraints, and technology developments are also discussed.

DOE

N91-19953# Department of Energy, Washington, DC. Materials Sciences Div.

MATERIALS SCIENCES PROGRAMS Report, FY 1990

Jan. 1991 164 p

(DE91-007601; DOE/ER-0483P) Avail: NTIS HC/MF A08

The purpose of this report is to provide a convenient compilation and index of the DOE Materials Sciences Division programs. This compilation is primarily intended for use by administrators, managers, and scientists to help coordinate research. The report is divided into seven sections. Section A contains all Laboratory projects, Section B has all contract research projects, Section C has projects funded under the Small Business Innovation Research Program, Sections D and E have information on DOE collaborative research centers, Section F gives distribution of funding, and Section G has various indexes.

DOE

N91-20119*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, OH.

MULTIDISCIPLINARY RESEARCH OVERVIEW (IHPTET/NPSS)

LESTER D. NICHOLS and SUSAN M. JOHNSON *In its Aeropropulsion* 1991 20 p Mar. 1991

Avail: NTIS HC/MF A24 CSCL 21/5

The Integrated High Performance Turbine Engine Technology (IHPTET) Program and the Numerical Propulsion System Simulation (NPSS) Program are two aeropropulsion multidisciplinary efforts at NASA Lewis that complement each other. The IHPTET initiative is an experimental program to advance engine development and double propulsion system capability by the turn of the century. NASA Lewis is contributing, with the Department of Defense and seven major aerospace contractors, to the development of these advanced, military, high-performance engines in the areas of compressors, combustors, turbines, nozzles, controls, mechanical systems, instrumentation, materials, structures, and computational fluid dynamics. The NPSS effort is a computational, long-range program with the goal of reducing the cost and time of development for advanced-technology propulsion systems. This goal will be achieved through a cooperative effort of NASA, industry, universities, and other government agencies to develop the necessary technologies for integrating disciplines, components, and high-performance computing into a user-friendly simulation environment. This simulation allows for comprehensive evaluation of new concepts early in the design phase, before a commitment to hardware is made. It also allows for rapid assessment of field-related problems, particularly where operational problems are encountered during conditions that are difficult to simulate experimentally. Data generated from the IHPTET engines will be used to help validate NPSS computations.

Author

N91-20166# Joint Publications Research Service, Arlington, VA.

ISSUES IN SPACE POLICY, BUDGETING

VSEVOLOD SERGEYEVICH AVDUYEVSKIY and LEONID VASILYEVICH LESKOV *In its JPRS Report: Science and Technology. USSR: Space* p 54-72 26 Nov. 1990 Transl. into ENGLISH from Novoye v Zhizni, Nauke, Tekhnike: Seriya Kosmonavtika, Astronomiya (Moscow, USSR), no. 4, Apr. 1990 p 3-49

Avail: NTIS HC/MF A06

The book discusses the prospects for the development of the Soviet space program and analyzes the possible ways and means for increasing its return to the national economy.

Author

N91-20339# Los Alamos National Lab., NM. Mechanical and Electronic Engineering Div.

ULTRA-WIDEBAND RADAR: RESEARCH AND DEVELOPMENT CONSIDERATIONS

5 Jun. 1989 141 p Sponsored by Naval Ocean Systems

Center, San Diego, CA
(AD-A229882; LA-UR-89-1420) Avail: NTIS HC/MF A07 CSCL 17/9

An initial investigation into the technology of impulse radar is provided. The principal purpose is to provide a road map for exploratory development by defining critical technology issues for a research investment strategy. There are urgent requirements for improving radar capability for target identification or noncooperative target recognition (NCTR). Progress in NCTR was primarily in information processing, with few technological advances in the sensor domain. Impulse radar provides new and revolutionary ideas which can offer new capabilities for active surveillance. These capabilities are discussed along with issues that must be resolved before system development is undertaken. GRA

N91-20554*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

PHOTOVOLTAIC SYSTEM CRITERIA DOCUMENTS. VOLUME 4: REVIEW CRITERIA FOR PHOTOVOLTAIC APPLICATIONS

JOHN C. KOENIG, JOSEPH W. BILLITTI, and JOHN M. TALLON
15 Oct. 1979 12 p Prepared for DOE, Washington, DC
(Contract NAS7-100)
(NASA-CR-183319; JPL-5250-3-VOL-4; NAS 1.26:183319) Avail:
NTIS HC/MF A03 CSCL 10/1

Guidelines are provided for the organization, preparation and conduct of program reviews for photovoltaic applications. These criteria apply to all photovoltaic applications. They include, but are not limited to, the following: (1) Conceptual design review; (2) Preliminary design review; (3) Critical design review; and (4) Operational readiness review. Contract goal's and objectives are met through program monitoring for cost, schedule, and performance for both managerial and technical elements for all PV applications activities. Author

N91-20556*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

PHOTOVOLTAIC SYSTEM CRITERIA DOCUMENTS. VOLUME 1: GUIDELINES FOR EVALUATING THE MANAGEMENT AND OPERATIONS PLANNING OF PHOTOVOLTAIC APPLICATIONS

JOHN C. KOENIG, JOSEPH W. BILLITTI, and JOHN M. TALLON
15 Oct. 1979 27 p Prepared for DOE, Washington, DC
(Contract NAS7-100)
(NASA-CR-183316; JPL-5250-3-VOL-1; NAS 1.26:183316) Avail:
NTIS HC/MF A03 CSCL 10/1

Guidelines are provided to the Field Centers for organization, scheduling, project and cost control, and performance in the areas of project management and operations planning for Photovoltaics Test and Applications. These guidelines may be used in organizing a T and A Project Team for system design/test, site construction and operation, and as the basis for evaluating T and A proposals. The attributes are described for project management and operations planning to be used by the Field Centers. Specifically, all project management and operational issues affecting costs, schedules and performance of photovoltaic systems are addressed. Photovoltaic tests and applications include residential, intermediate load center, central station, and stand-alone systems. The sub-categories of system maturity considered are: Initial System Evaluation Experiments (ISEE); System Readiness Experiments (SRE); and Commercial Readiness Demonstration Projects (CRDP). Author

N91-20976# National Academy of Sciences - National Research Council, Washington, DC. Office of Japan Affairs.

LEARNING THE R AND D SYSTEM: UNIVERSITY RESEARCH IN JAPAN AND THE UNITED STATES

1989 27 p
(PB91-130443) Avail: NTIS HC/MF A03 CSCL 05/1

The Office of Japan Affairs of the National Research Council is organizing a series of workshops on the differences and similarities in the working environment for research in Japan and the United States. Understanding these differences is essential to American scientists and engineers to improve access to Japan's research system, and to expand mutually beneficial collaboration

between the two countries. The first workshop was on the culture of academic research, large university research laboratories, university-industry relations, and the experiences of foreign researchers in the United States and Japan. The major insights garnered from the two-day meeting are highlighted. GRA

N91-21959*# National Aeronautics and Space Administration, Langley Research Center, Hampton, VA.

NASA/DOD AEROSPACE KNOWLEDGE DIFFUSION RESEARCH PROJECT. PAPER 9: INFORMATION INTERMEDIARIES AND THE TRANSFER OF AEROSPACE SCIENTIFIC AND TECHNICAL INFORMATION (STI). A REPORT FROM THE FIELD

J. D. EVELAND (Claremont Graduate School, CA.) and THOMAS E. PINELLI 9 Apr. 1991 16 p Submitted for publication
Prepared in cooperation with Department of Defense, Washington, DC, and Indiana Univ., Bloomington
(NASA-TM-103384; NAS 1.15:103384) Avail: NTIS HC/MF A03 CSCL 05/2

From the NASA/DOD survey data, there can be no way of inferring what strategy for knowledge transfer is best; indeed, given the fact that the respondents were all presumably well qualified professionals, the data tend to call into serious question the idea that any one model might meet the needs of more than a distinct minority of possible users. The evidence to date appears to reinforce the concept that different information environments take many different shapes, and interact with each other and with formal data transmission sources in many different and equally valuable ways. Any overall strategy for improving the effectiveness and efficiency of scientific and technical information sharing must take this divergence into account, and work toward the creation of systems that reinforce true interactive knowledge utilization rather than simply disseminating data. Author

N91-22378# National Critical Technologies Panel, Arlington, VA.
REPORT OF THE NATIONAL CRITICAL TECHNOLOGIES PANEL

Mar. 1991 109 p
(PB91-156869) Avail: NTIS HC/MF A06; also available SOD HC \$9.50 as 040-000-00-557-9

Twenty-two technologies deemed critical to the national economic prosperity and to national security have been identified. The selection of national critical technologies was carried out by a panel appointed by the Director, Office of Science and Technology Policy, Executive Office of the President. The study was authorized by the Fiscal Year 1990 Defense Authorization Act and will be updated biennially through the year 2000. This panel report discusses each technology separately with respect to scope, basis for selection, and international trends. The technologies fall into six broad areas: materials, manufacturing, information and communications, biotechnology and life sciences, aeronautics and surface transportation, and energy and environment. A major conclusion of the study is that technology alone cannot ensure economic prosperity and national security. Technology can make an important contribution to the future of U.S. national interests, but only if we learn to use it more effectively. Author

N91-22605*# National Aeronautics and Space Administration, Washington, DC.

NASA EARTH SCIENCE AND APPLICATIONS DIVISION: THE PROGRAM AND PLANS FOR FY 1988-1989-1990

Sep. 1988 129 p
(NASA-TM-104943; NAS 1.15:104943) Avail: NTIS HC/MF A07 CSCL 08/2

Described here are the Division's research goals, priorities and emphases for the next several years and an outline of longer term plans. Included are highlights of recent accomplishments, current activities in FY 1988, research emphases in FY 1989, and longer term future plans. Data and information systems, the Geodynamics Program, the Land Processes Program, the Oceanic Processes Program, the Atmospheric Dynamics and Radiation

06 RESEARCH AND DEVELOPMENT

Program, the Atmospheric Chemistry Program, and space flight programs are among the topic covered. Author

N91-22934* National Aeronautics and Space Administration, Washington, DC.

NASA LIBRARY PROJECT MANAGEMENT COLLECTION

Apr. 1991 53 p

(NASA-TM-103326; NAS 1.15:103326) Avail: Issuing Activity

CSCL 05/2

A selection of annotated references to unclassified reports, journal articles, and conference proceeding papers introduced into the NASA scientific and technical information system in Scientific and Technical Aerospace Reports (STAR) and International Aerospace Reports (IAA) are given. Subject areas covered include cost analysis, contract management, engineering management, government procurement, life cycle costs, logistics management, maintainability, management methods, management planning, manpower, mission planning, operations research, personnel management, reliability engineering, scheduling, system effectiveness, systems engineering, and systems management.

Author

N91-23201# Synthesis Group, Arlington, VA.

AMERICA AT THE THRESHOLD

1991 191 p Prepared for the Executive Office of the President, Washington, DC Original contains color illustrations Contains poster as supplement

Avail: NTIS HC/MF A09; also available SOD HC \$13.00 as 033-000-01097-4

The Space Exploration Initiative is a challenge issued by President Bush that will return America to the Moon to stay and onward to Mars by 2019. In doing this, six 'visions' guide and direct the space efforts. These efforts are: Knowledge of the universe; Advancement in science and engineering; U.S. leadership; Technologies for Earth; Commercialization of space; and Strengthened U.S. economy. Why the Moon and Mars were chosen as the objects of exploration is examined. Ten recommendations are provided for the effective implementation of the SPI, along with a detailed examination of each. Author

N91-23501*# National Aeronautics and Space Administration, Lewis Research Center, Cleveland, OH.

GOVERNMENT/INDUSTRY RESPONSE TO QUESTIONNAIRE ON SPACE MECHANISMS/TRIBOLOGY TECHNOLOGY NEEDS

ROBERT L. FUSARO May 1991 76 p

(NASA-TM-104358; E-6148; NAS 1.15:104358) Avail: NTIS

HC/MF A05 CSCL 13/9

President Bush has proposed that the U.S. undertake an ambitious mission of manned and robotic exploration of the solar system. This mission will require advanced mechanical moving components, such as bearings, gears, seals, lubricants, etc. There has been concern in the NASA community that the current technology level in these mechanical component/tribology areas may not be adequate to meet the goals of such a mission. To attempt to answer this, NASA-Lewis has sent out a questionnaire to government and industry workers (who have been involved in space mechanism research, design, and implementation) to ask their opinion if the current space mechanisms technology (mechanical components/tribology) is adequate to meet future NASA Missions needs and goals. If they deemed that the technology base inadequate, they were asked to specify the areas of greatest need. The unedited remarks of those who responded to the survey are presented. Author

N91-23998# Office of Technology Assessment, Washington, DC.

FEDERALLY FUNDED RESEARCH: DECISIONS FOR A DECADE

GPO May 1991 297 p

(OTA-SET-490) Avail: NTIS HC/MF A13; also available SOD HC \$12.00 as 052-003-01241-3

Given the exceptional history, strength, and character of U.S. research, there will always be more opportunities than can be

funded, more deserving researchers competing than can be sustained, and more institutions seeking to expand than the prime sponsor (the Federal Government) can fund. The objective for government, then, is to ensure continued funding for a full portfolio of first-rate research and a high caliber research work force to assure long term scientific progress. Analyzed herein is what the Office of Technology Assessment identifies as four pressing challenges for the research system in the 1990s: setting priorities in funding, understanding trends in research expenditures; preparing human resources for the future research work force; and supplying appropriate data for ongoing research decision making. Managing the Federal research system requires more than funding; it means devising ways to retain the diversity and creativity that have distinguished U.S. contribution to scientific knowledge. Author

N91-24339*# Pratt and Whitney Aircraft, West Palm Beach, FL.

ADVANCED LAUNCH SYSTEM ADVANCED DEVELOPMENT OXIDIZER TURBOPUMP PROGRAM: TECHNICAL IMPLEMENTATION PLAN

F. FERLITA 23 Jun. 1989 86 p

(Contract NAS8-37595)

(NASA-CR-183729; NAS 1.26:183729; PWA-FR-20865) Avail:

NTIS HC/MF A05 CSCL 21/8

The Advanced Launch Systems (ALS) Advanced Development Oxidizer Turbopump Program has designed, fabricated and demonstrated a low cost, highly reliable oxidizer turbopump for the Space Transportation Engine that minimizes the recurring cost for the ALS engines. Pratt and Whitney's (P and W's) plan for integrating the analyses, testing, fabrication, and other program efforts is addressed. This plan offers a comprehensive description of the total effort required to design, fabricate, and test the ALS oxidizer turbopump. The proposed ALS oxidizer turbopump reduces turbopump costs over current designs by taking advantage of design simplicity and state-of-the-art materials and producibility features without compromising system reliability. This is accomplished by selecting turbopump operating conditions that are within known successful operating regions and by using proven manufacturing techniques. Author

N91-24441# Rutgers - The State Univ., New Brunswick, NJ.

FRENCH-AMERICAN STRUCTURAL CERAMICS ROUNDTABLE Final Report

JACK WENZEL 23 Jan. 1991 17 p Presented at the Technical Meeting on Advanced Structural Ceramics, New Brunswick, NJ, 14 Dec. 1989

(Contract AF-AFOSR-0319-90)

(AD-A233146; AFOSR-91-0213TR) Avail: NTIS HC/MF A03

CSCL 11/2

Rutgers University hosted a one-day French-American technical meeting on advanced structural ceramics. Participants included seven French researchers and eight U.S. researchers from government, academia, and industry. Each participant discussed his home research institution from several view points: research themes, research capabilities, and technology transfer. GRA

N91-25901# Department of Energy, Washington, DC. Office of Program Analysis.

PROCEDURES FOR PEER REVIEW ASSESSMENTS

Apr. 1991 35 p

(DE91-010902; DOE/ER-0491P) Avail: NTIS HC/MF A03

These assessment procedures provide the basis for implementing the methodology developed by the Office of Program Analysis (OPA) for assessing the quality of research and development within the Department of Energy (DOE). The reviews are performed by examining individual projects which comprise a program and by assessing the quality of the research, quality of the research team, productivity, probability of success, and mission relevance for each project reviewed. OPA's methodology entails assembling panels of scientific and technical experts to evaluate individual projects. Inferences about the quality of the overlying program emerge from analysis of the ratings given all of the program's individual projects or, in the case of a large program,

statistical analysis of a properly drawn sample of individual research projects. DOE

N91-26111# Department of Energy, Washington, DC.
TECHNOLOGY 1990

Jan. 1991 192 p
(DE91-005072; DOE/ER-0484P) Avail: NTIS HC/MF A09

The U.S. Department of Energy (DOE) laboratories have a long history of excellence in performing research and development in a number of areas, including the basic sciences, applied-energy technology, and weapons-related technology. Although technology transfer has always been an element of DOE and laboratory activities, it has received increasing emphasis in recent years as U.S. industrial competitiveness has eroded and efforts have increased to better utilize the research and development resources the laboratories provide. This document, Technology '90, is the latest in a series that is intended to communicate some of the many opportunities available for U.S. industry and universities to work with the DOE and its laboratories in the vital activity of improving technology transfer to meet national needs. Technology '90 is divided into three sections: Overview, Technologies, and Laboratories. The Overview section describes the activities and accomplishments of the DOE research and development program offices. The Technologies section provides descriptions of new technologies developed at the DOE laboratories. The Laboratories section presents information on the missions, programs, and facilities of each laboratory, along with a name and telephone number of a technology transfer contact for additional information. Separate papers were prepared for appropriate sections of this report. DOE

N91-27046# Committee on Science, Space and Technology (U.S. House).

**NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
MULTIYEAR AUTHORIZATION ACT OF 1991**

GEORGE E. BROWN, JR., RALPH M. HALL, TOM LEWIS, F. JAMES SENSENBRENNER, JR., and TIM VALENTINE
Washington GPO 23 Apr. 1991 22 p A bill on H.R. 1988 referred to the Committee on Science, Space and Technology, 102d Congress, 1st Session, 23 Apr. 1991
Avail: Document Room, House of Representatives, Washington, DC 20515 HC free

Presented here is the text for a bill to authorize appropriations to the National Aeronautics and Space Administration (NASA) for research and development, space flight, control, data communications, construction of facilities, research and program management, and the Inspector General, as well as for other purposes. Author

N91-27055*# National Aeronautics and Space Administration, Washington, DC.

**REPORT OF THE 90-DAY STUDY ON HUMAN EXPLORATION
OF THE MOON AND MARS**

Nov. 1989 159 p
(NASA-TM-102999; NAS 1.15:102999) Avail: NTIS HC/MF A08 CSCL 03/2

The basic mission sequence to achieve the President's goal is clear: begin with Space Station Freedom in the 1990's, return to the Moon to stay early in the Next century, and then journey to Mars. Five reference approaches are modeled building on past programs and recent studies to reflect wide-ranging strategies that incorporate varied program objectives, schedules, technologies, and resource availabilities. The reference approaches are (1) balance and speed; (2) the earliest possible landing on Mars; (3) reduce logistics from Earth; (4) schedule adapted to Space Station Freedom; and (5) reduced scales. The study and programmatic assessment have shown that the Human Exploration Initiative is indeed a feasible approach to achieving the President's goals. Several reasonable alternatives exist, but a long-range commitment and significant resources will be required. However, the value of the program and the benefits to the Nation are immeasurable. B.G.

N91-27108*# Houston Univ., TX. Coll. of Architecture.
**DEVELOPING A TAXONOMY FOR MISSION ARCHITECTURE
DEFINITION Final Report**
DEBORAH J. NEUBEK *In its* NASA/ASEE Summer Faculty Fellowship Program, 1990, Volume 2 9 p Dec. 1990
(Contract NGT-44-005-803)
Avail: NTIS HC/MF A09 CSCL 22/1

The Lunar and Mars Exploration Program Office (LMEPO) was tasked to define candidate architectures for the Space Exploration Initiative to submit to NASA senior management and an externally constituted Outreach Synthesis Group. A systematic, structured process for developing, characterizing, and describing the alternate mission architectures, and applying this process to future studies was developed. The work was done in two phases: (1) national needs were identified and categorized into objectives achievable by the Space Exploration Initiative; and (2) a program development process was created which both hierarchically and iteratively describes the program planning process. Author

N91-27177*# National Aeronautics and Space Administration, Langley Research Center, Hampton, VA.

**TECHNOLOGY FOR THE FUTURE: IN-SPACE TECHNOLOGY
EXPERIMENTS PROGRAM, PART 1**

ROGER A. BRECKENRIDGE, comp., LENWOOD G. CLARK, comp., KELLI F. WILLSHIRE, comp., SHERWIN M. BECK, comp., and LISA D. COLLIER, comp. (Computer Technology Associates, Inc., Hampton, VA.) Jun. 1991 304 p Workshop held in Atlanta, GA, 6-9 Dec. 1988
(NASA-CP-10073-PT-1; NAS 1.55:10073-PT-1) Avail: NTIS HC/MF A14 CSCL 22/2

The purpose of the Office of Aeronautics and Space Technology (OAST) In-Space Technology Experiment Program (In-STEP) 1988 Workshop was to identify and prioritize technologies that are critical for future national space programs and require validation in the space environment, and review current NASA (In-Reach) and industry/university (Out-Reach) experiments. A prioritized list of the critical technology needs was developed for the following eight disciplines: structures; environmental effects; power systems and thermal management; fluid management and propulsion systems; automation and robotics; sensors and information systems; in-space systems; and humans in space. This is part one of two parts and is the executive summary and experiment description. The executive summary portion contains keynote addresses, strategic planning information, and the critical technology needs summaries for each theme. The experiment description portion contains brief overviews of the objectives, technology needs and backgrounds, descriptions, and development schedules for current industry, university, and NASA space flight technology experiments. Author

N91-27178*# National Aeronautics and Space Administration, Langley Research Center, Hampton, VA.

**TECHNOLOGY FOR THE FUTURE: IN-SPACE TECHNOLOGY
EXPERIMENTS PROGRAM, PART 2**

ROGER A. BRECKENRIDGE, comp., LENWOOD G. CLARK, comp., KELLI F. WILLSHIRE, comp., SHERWIN M. BECK, comp., and LISA D. COLLIER, comp. (Computer Technology Associates, Inc., Hampton, VA.) Jun. 1991 304 p Workshop held in Atlanta, GA, 6-9 Dec. 1988
(NASA-CP-10073-PT-2; NAS 1.55:10073-PT-2) Avail: NTIS HC/MF A14 CSCL 22/2

The purpose of the Office of Aeronautics and Space Technology (OAST) In-Space Technology Experiments Program In-STEP 1988 Workshop was to identify and prioritize technologies that are critical for future national space programs and require validation in the space environment, and review current NASA (In-Reach) and industry/university (Out-Reach) experiments. A prioritized list of the critical technology needs was developed for the following eight disciplines: structures; environmental effects; power systems and thermal management; fluid management and propulsion systems; automation and robotics; sensors and information systems; in-space systems; and humans in space. This is part two of two parts and

contains the critical technology presentations for the eight theme elements and a summary listing of critical space technology needs for each theme. Author

N91-27511*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, OH.

RESEARCH AND DEVELOPMENT OF OPTICAL MEASUREMENT TECHNIQUES FOR AEROSPACE PROPULSION RESEARCH: A NASA LEWIS RESEARCH CENTER PERSPECTIVE

DANIEL J. LESCO 1991 12 p Presented at the Second International Conference on Photomechanics and Speckle Metrology, San Diego, CA, 22-26 Jul. 1991; sponsored by the Society of Photo-Optical Instrumentation Engineers (NASA-TM-104418; E-6251; NAS 1.15:104418) Avail: NTIS HC/MF A03 CSCL 14/2

The applied research effort required to develop new nonintrusive measurement techniques capable of obtaining the data required by aerospace propulsion researchers and of operating in the harsh environments encountered in research and test facilities is discussed and illustrated through several ongoing projects at NASA's Lewis Research Center. Factors including length of development time, funding levels, and collaborative support from fluid-thermal researchers are cited. Progress in developing new instrumentation via a multi-path approach, including NASA research, grant, and government-sponsored research through mechanisms like the Small Business Innovative Research program, is also described. Author

N91-28023# Department of Defense, Washington, DC. Directorate for Information Operations and Reports.

THE 500 CONTRACTORS RECEIVING THE LARGEST DOLLAR VOLUME OF PRIME CONTRACT AWARDS FOR RDT AND E, FISCAL YEAR 1990

1990 37 p (AD-A235444; DIOR/P02-90; P02) Avail: NTIS HC/MF A03 CSCL 05/9

Summary data is presented on the 500 prime contractors receiving the largest dollar volume in Department of Defense (DoD) awards over \$25,000 for research, development, test and evaluation (RDT and E) work during Fiscal Year (FY) 1990. RDT and E work can include research, exploratory development, advanced development, engineering development, operational systems development, or management and support services. Table 1 lists the 500 contractors in alphabetical order, shows the ranking for each, and shows how each has been categorized for reporting purposes. The categories are business firm (B), foreign contractor (F), and nonprofit institution (N). Table 2 shows the net value of awards to U.S. business firms by rank. Those firms which qualify as small businesses are further identified by an S. The net value of awards to each of the firm's reported locations is also provided. Tables 3, 4, and 5 provide the net value of awards to U.S. educational and other nonprofit institutions, foreign contractors, and U.S. government agencies. (While awards to U.S. government agencies are listed separately in Table 5, these agencies are categorized as nonprofit institutions in Table 1.) As in Table 2, contractors in Tables 3 through 5 are shown by rank, with their total awards indicated by an asterisk. The net value of awards to each of the contractor's reported locations are also shown for these tables. GRA

N91-28027# National Academy of Sciences - National Research Council, Washington, DC. Commission on Engineering and Technical Systems.

RESEARCH ON THE MANAGEMENT OF TECHNOLOGY: UNLEASHING THE HIDDEN COMPETITIVE ADVANTAGE Final Report

Apr. 1991 50 p Sponsored by NSF (PB91-184085) Avail: NTIS HC/MF A03 CSCL 05/1

A research agenda is outlined for industry, universities, the National Science Foundation, and the National Research Council, that addresses the need to increase rapidly the effectiveness of technological factors such as research, development,

implementation, engineering, and manufacturing. It is crucial for these factors to be managed skillfully to maximize competitive advantage from both a business and a technological perspective. This is the domain of management of technology (MoT) a critical factor for assuring success in today's business world. Progress since 1987 has been mixed. The university/theoretical side of the field has grown slowly, while academe and industry have not specifically addressed many of the topics that were suggested in 1987, the communication gap between academe and industry remains large; and the limited results of research on MoT have not had a significant impact on improving America's Competitive situation. No substantive support has appeared among the federal agencies for MoT research, and support of MoT research by industry is sparse. GRA

N91-28047# Committee on Science, Space and Technology (U.S. House).

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION MULTIYEAR AUTHORIZATION ACT OF 1991

GEORGE E. BROWN, JR. Washington GPO 25 Apr. 1991 72 p Report to accompany H.R. 1988 presented by the Committee on Science, Space and Technology, 101st Congress, 1st Session, 25 Apr. 1991

(H-REPT-102-41; GPO-49-006) Avail: Document Room, House of Representatives, Washington, DC, 20515 HC free

This report, submitted by the House Committee on Science, Space, and Technology, reviews the bill (H.R. 1988) to authorize appropriations to NASA for fiscal years 1992, 1993, and 1994, and to the Department of Transportation Office of Commercial Space Transportation, the Department of Commerce Office of Space Commerce, and the National Space Council within the Executive Office of the President. The bill authorizes appropriations to NASA for research and development; space flight, control, and data communications; construction of facilities; research and program management; and for other purposes. The bill also sets forth special policy provisions and authorities in order to carry out the activities of the civil space program. The report reflects favorably upon the bill with an amendment and recommends the bill as amended to pass. Author

N91-28214*# National Aeronautics and Space Administration, Washington, DC.

NATIONAL AERO-SPACE PLANE (NASP) PROGRAM

MING H. TANK *In its* Space Transportation Propulsion Technology Symposium. Volume 2: Symposium Proceedings p 383-407 May 1991

Avail: NTIS HC/MF A99 CSCL 21/8

A program to develop the technology for reusable airbreathing hypersonic/transatmospheric vehicles is addressed. Information on the following topics is presented in viewgraph form: (1) the National Aerospace Plane (NASP) program schedule; (2) the NASP program organization; (3) competitive strategy; (4) propulsion options; (5) wind tunnel data available for NASP; (6) ground track of envelope expansion; and (7) altitude vs. Mach number. A NASP/Space Shuttle comparison, NASP configuration matrix, and the propulsion concept of a high speed scramjet are also briefly addressed. K.S.

N91-28283# Oak Ridge National Lab., TN.

TECHNOLOGIES AVAILABLE FROM MARTIN MARIETTA ENERGY SYSTEMS, INC.

1991 29 p (Contract DE-AC05-84OR-21400) (DE91-013027; ORNL/M-1312) Avail: NTIS HC/MF A03

This document summarizes some of the specific technologies available from Oak Ridge National Laboratory (ORNL) and the other Oak Ridge plants managed and operated by Martin Marietta Energy Systems, Inc. (Energy Systems) for the Department of Energy (DOE). From the beginning, we have concentrated our efforts on those areas of technology development for which we have become known as a center of excellence. Our most notable area of success is in advanced materials. From superalloys to ceramics to electronic materials, Oak Ridge is internationally

recognized as a leader in advanced materials. Other areas where we have unique technical expertise include: analytical instruments, waste management, intelligent systems, and chemical processing.
DOE

N91-28404# National Inst. of Standards and Technology, Gaithersburg, MD.
US ASSESSMENT OF THE NEW DIAMOND TECHNOLOGY IN JAPAN Final Report
A. FELDMAN and L. H. SCHWARTZ Jan. 1991 100 p
(PB91-167395; NIST/SP-807) Avail: NTIS HC/MF A05 CSCL 11/3

The purpose is to assess the level of scientific activity, areas of intended commercialization, progress in commercialization, the role of the Japanese Government in assisting industry to exploit the new diamond technology, and the relative positions of Japan and the U.S. in all aspects of synthesized diamond technology. Japanese efforts were chosen for assessment because Japan is the apparent world leader in the drive for commercialization of the technology. The principle focus is on diamond produced by chemical vapor deposition, with a peripheral investigation of cubic boron nitride and diamond-like carbon. Based on the assessment, a set of conclusions and recommendations is presented. The assessment is based on site visits in Japan between 28 May to Jun. 5 1990.
GRA

N91-29176*# Research Triangle Inst., Research Triangle Park, NC. Center for Digital Systems Research.
ASSESSMENT TEAM REPORT ON FLIGHT-CRITICAL SYSTEMS RESEARCH AT NASA LANGLEY RESEARCH CENTER
DANIEL P. SIEWIOREK, comp. and JANET R. DUNHAM, comp. Aug. 1989 71 p
(Contract NAS1-17964)
(NASA-CR-181850; NAS 1.26:181850) Avail: NTIS HC/MF A04 CSCL 01/3

The quality, coverage, and distribution of effort of the flight-critical systems research program at NASA Langley Research Center was assessed. Within the scope of the Assessment Team's review, the research program was found to be very sound. All tasks under the current research program were at least partially addressing the industry needs. General recommendations made were to expand the program resources to provide additional coverage of high priority industry needs, including operations and maintenance, and to focus the program on an actual hardware and software system that is under development.
Author

N91-29296# Oak Ridge National Lab., TN.
A BRIEF OVERVIEW OF THE ACTIVITIES AND ACCOMPLISHMENTS OF THE METALS AND CERAMICS DIVISION Progress Report, period ending 30 Sep. 1990
Apr. 1991 174 p
(Contract DE-AC05-84OR-21400)
(DE91-014955; ORNL-6653) Avail: NTIS HC/MF A08

This report provides a brief overview of the activities and accomplishments of the Metals and Ceramics (M and C) Division during fiscal year (FY) 1990. The division is organized to provide technical support, primarily in the area of structural materials, for the various technologies being developed by the U.S. Department of Energy (DOE). Activities span the range from basic research (through applied research and engineering development) to industrial research (through cooperative research and a strong technology transfer program). The division is organized in functional groups that encompass nearly all of the disciplines needed to develop and to apply materials in structural applications. Sections 1 through 4 describe the different functional groups; Section 5 provides an alternative view of the division in terms of the major programs, most of which cross group lines; and Section 6 summarizes external interactions including cooperative research programs and technology transfer activities. Appendices describe the organizational structure, note personnel changes, present honors and awards received by division members, and contain

listings of publications completed and presentations made at technical meetings.
DOE

N91-29649# Midwest Research Inst., Golden, CO.
THE DEPARTMENT OF ENERGY'S SOLAR INDUSTRIAL PROGRAM: NEW IDEAS FOR AMERICAN INDUSTRY
J. V. ANDERSON, S. G. HAUSER, and R. J. CLYNE Jul. 1991 8 p Presented at the 26th Intersociety Energy Conversion Engineering (IECE) Conference, Boston, MA, 3-9 Aug. 1991 (Contract DE-AC02-83CH-10093)
(DE91-002197; SERI-TP-250-4256; CONF-910801-15) Avail: NTIS HC/MF A02

As society becomes more and more sensitive to the environment, and energy supplies become scarcer, the application of solar energy is expanding into new areas. The industrial sector is one of the most difficult for solar energy to impact because of its technical diversity and economic requirements. However, the opportunities are still abundant. The Department of Energy's Solar Industrial Program is dedicated to advancing the applications of solar energy in this sector. Research and technology development activities are currently focused in three areas: solar process heat, advanced materials manufacturing, and destruction of chemical wastes. The Solar Energy Research Institute manages these activities for DOE with close interactions with other Federal agencies, private industry, and universities.
DOE

N91-30174# Joint Publications Research Service, Arlington, VA.
GALEYEV DISCUSSES HISTORY, PROSPECTS OF INSTITUTE OF SPACE RESEARCH
ALBRRT ABUBAKIROVICH GALEYEV *In its* JPRS Report: Science and Technology. USSR: Space p 34-39 26 Jun. 1991 Transl. into ENGLISH from Zemlya i Vselennaya, Moscow (USSR) Nov.-Dec. 1990 p 38-45
Avail: NTIS HC/MF A04

The research activities at the USSR Academy of Sciences Space Research Institute are discussed. It became the head organization in the field of scientific research involving space, the solar system's planets, and astrophysical objects. It was entrusted with preparing and supporting programs for space research, developing, testing, and using scientific equipment for that research, and ensuring international cooperation in the performance of experiments in space.
Author

N91-30974# Air Force Inst. of Tech., Wright-Patterson AFB, OH. School of Systems and Logistics.
DEFINING ACQUISITION AND CONTRACTING TERMS ASSOCIATED WITH CONTRACT ADMINISTRATION M.S. Thesis
LAURELI M. MOYLE Sep. 1990 147 p
(AD-A229462; AFIT/GCM/LSY/90S-10) Avail: NTIS HC/MF A07 CSCL 05/1

The purpose of this study was to synthesize definitions for 20 terms associated with contract administration. To accomplish this objective, research on dictionary and definition development was conducted. Also, literature was comparatively analyzed to synthesize definitions for each term. To validate the definitions a survey was administered to the NCMA Fellows. Respondents evaluated each definition using a Likert scale and provided written comments. Likert scale results were presented in bar chart form along with an arithmetic mean. Plus, if warranted, the respondents' suggestions were incorporated into the final definitions. As a result, finalized proposed definitions were developed and recommended for inclusion in any future dictionary of contract terminology. In conclusion, the need for further research will continue until all unique and arbitrary words in the contract management arena have been thoroughly researched and their descriptions documented.
GRA

N91-30975# Air Force Inst. of Tech., Wright-Patterson AFB, OH.
THE EFFECT OF THE COMMERCIAL SPACE LAUNCH ACT ON DEPARTMENT OF DEFENSE CONTRACT ADMINISTRATION M.S. Thesis

06 RESEARCH AND DEVELOPMENT

MICHAEL E. HALE Sep. 1990 114 p
(AD-A229497; AFIT/GCM/LSP/90S-3) Avail: NTIS HC/MF A06
CSCL 05/1

This study analyzes the Commercial Space Launch Act and the effect of the Act on Department of Defense contract administration. The Act is commercial space launch industry. The literature review provides a comprehensive overview of the Act, the current environment of space commercialization, and the future of the space launch industry. The method of acquiring the necessary data used in the study was the telephone interview. Commanders of Department of Defense contract administration units were surveyed to determine their knowledge and awareness of the Act. The study found that the Act was being administered adequately at those locations which reported involvement; however, there were serious problems in the administrative guidance on the Act and the process of reimbursement for government provided contract administrative services. The study makes numerous recommendations for improvement to include: rewriting the current Act guidance and forming a focal point for commercial space within the newly formed Defense Contract Management Command. GRA

N91-30980# Government-Univ.-Industry Research Roundtable, Washington, DC.

INDUSTRIAL PERSPECTIVES ON INNOVATION AND INTERACTIONS WITH UNIVERSITIES: SUMMARY OF INTERVIEWS WITH SENIOR INDUSTRIAL OFFICIALS

Feb. 1991 29 p Prepared in cooperation with Industrial Research Inst., Inc., New York, NY
(Contract DE-FG05-89ER-75498)
(DE91-013939; DOE/ER-75498/9) Avail: NTIS HC/MF A03

As a natural extension of earlier Government-University-Industry Research Roundtable efforts that mapped the diversity of university-industry research alliances, the Roundtable, in conjunction with the Industrial Research Institute, has examined industrial perspectives on how innovation occurs and on how alliances with universities are expected to contribute to technical change and competitiveness within individual companies. This examination was carried out initially through individual discussions with seventeen senior research managers representing a range of fields of research as well as a variety of sizes and types of companies. The results of the individual interviews were summarized and reviewed by the industry interviewees, a few members of the Roundtable Council, and senior federal R and D officials at a meeting in October 1990. Comments from that meeting have been incorporated into the summary of the interviews presented here. DOE

N91-31730 British Aerospace Public Ltd. Co., Bristol (England). Sowerby Research Center.

THE SOWERBY RESEARCH CENTRE AND UNIVERSITY LIAISON

J. ACKROYD *In its* BAe University Round Table on Gravitational Research 3 p Nov. 1990
Copyright Avail: British Aerospace (Military Aircraft) Ltd., Warton Aerodrome, Preston, Lancashire PR4 1AX, England

An introduction to the Sowerby Research Centre and its links with universities is presented. Although in some cases universities are an alternative resource to BAe (British Aerospace) facilities there are others where they are clearly the most appropriate choice: fundamental studies to elicit basic understanding is one such case and speculative studies may be another less obvious one. ESA

N91-31985# Government-Univ.-Industry Research Roundtable, Washington, DC.

SURVEY TO ASSESS THE USEFULNESS OF TWO MODEL AGREEMENTS FOR UNIVERSITY-INDUSTRY COOPERATIVE RESEARCH

Aug. 1990 17 p Prepared in cooperation with Industrial Research Inst., Inc., New York, NY
(Contract DE-FG05-89ER-75498)
(DE91-013937; DOE/ER-75498/6) Avail: NTIS HC/MF A03

In 1988, the Government-University-Industry Research

Roundtable together with the Industrial Research Institute (IRI) published Simplified and Standardized Model Agreements for University-Industry Cooperative Research. Designed to serve as starting points for negotiating the details of research agreements between universities and industry sponsors, the publication includes two model agreements: a research grant and a research agreement. Their purpose was to decrease the time and effort required for such negotiations and to provide companies and universities new to research alliances a sense of what is reasonable to consider in establishing an agreement. Over 14,000 copies of the Model Agreements document have been distributed. To assess the extent to which the two models have fulfilled their intended purpose, and to determine what additional steps, if any, the roundtable can take to clarify operating procedures and minimize administrative burdens and requirements for university-industry research partnerships, the roundtable staff conducted a telephone survey in the fall of 1989 of about 70 university and industry users of the model agreements document. In addition to assessing the usefulness of the model agreements, survey participants suggested potential follow-on activities for the roundtable on issues of intellectual property and licensing. This document summarizes the results of the survey. DOE

N91-31986# Government-Univ.-Industry Research Roundtable, Washington, DC.

WHAT IS THE FEDERAL DEMONSTRATION PROJECT?

1990 14 p
(Contract DE-FG05-89ER-75498)
(DE91-013936; DOE/ER-75498/5) Avail: NTIS HC/MF A03

The Federal Demonstration Project is a cooperative effort between a number of universities, a private research institute, and several federal agencies to increase research productivity by eliminating unnecessary administrative procedures and by streamlining and standardizing needed controls. The Project aims to locate responsibility for decision-making as close as possible to principal investigators while maintaining necessary institutional and agency oversight to ensure accountability. By freeing researchers from some of their paperwork burden, more efficient research administration systems will enable investigators to spend more of their time doing science and engineering. The Federal Demonstration Project is an outgrowth of an earlier activity sponsored by five major federal R&D agencies at the Florida State University System and the University of Miami. In Florida, the focus was on standardizing and streamlining procedures for administering research grants after the grants had been awarded to the universities. In May 1988, the most successful of the demonstrated procedures were approved by the US Office of Management and Budget for use in grants awarded by any federal agency to any research organization. The new procedures give agencies authority to waive requirements that grantees obtain federal approval prior to taking a number of administrative actions with respect to grant management. The FDP institutions together with the participating federal agencies are designing and demonstrating innovative research administration procedures and are assessing the impact of those new procedures. DOE

N91-32102# Air Navigation Technical Service, Paris (France). Advanced Systems Div.

FRENCH SATCOM PROGRAM AND RELATED INTERNATIONAL ACTIVITIES

PASCAL SENARD and PATRICE GAUTHIER *In* FAA, The First Annual International Satellite Surveillance and Communication Symposium p 119-124 1991
Avail: NTIS HC/MF A19

The work is described that the French Administration wishes to undertake, or is currently performing, in the field of satellite communications used for ATC purposes. The aim of this work program is to prepare the possible integration of a future Satcom-based ATC system, in consistency with the needs specific to the French Civil Aviation and in harmony with the approach adopted at an international level. The context is presented in which French ATC authorities have to deal with the emerging concept

of satellite communications. A general presentation of the intended work program and of its successive steps is also included.

Author

N91-32108# Ministry of Transportation, Tokyo (Japan). Radio Engineering Div.

SATELLITE DATA LINK RESEARCH AND DEVELOPMENT PROGRAM IN JAPAN

HIROKI TAKEDA *In* FAA, The First Annual International Satellite Surveillance and Communication Symposium p 193-201 1991
Avail: NTIS HC/MF A19

In parallel with the Automatic Dependent Surveillance (ADS) Pacific Engineering Trail (PET) program which was initiated by Australia, U.S., and Japan, the research and development (R&D) program Satellite Data Link was promoted in Japan. Apart from ADS PET program, the Aircraft Earth Station (AES) and the Ground Earth Station (GES) to be used in this satellite data link R&D program are designed to be fully compatible with the ICAO AMSS Draft SARPs and INMARSAT SDM (System Definition Manual). The main purpose of this R&D program is to validate the bit oriented AMSS system based on the OSI (Open Systems Interconnection) model which is now under development in ICAO AMSSP (Aeronautical Mobile Satellite Service Panel).
Author

N91-32394# Siemens A.G., Munich (Germany, F.R.).

PROGRESS IN SUBMICRON TECHNOLOGIES

K. MERTEN and J. WINNERL *In* ESA, ESA Electronic Components Conference p 635-638 Mar. 1991
Copyright Avail: NTIS HC/MF A25; EPD, ESTEC, Noordwijk, Netherlands, HC 90 Dutch guilders

Every three years a fourfold increase in the number of functions per unit area on chip is experienced. Today logic integrated circuits with more than a million transistors are available. Logic chips in the 64 M generation are expected to provide more than 10 million components on a chip. Severe changes in the design and fabrication of integrated circuits are discussed. The main trends and characteristics in submicron technologies and requirements for new and more efficient design methodologies are discussed. Typical innovations in various fields of applications are considered.
ESA

N91-32472*# Research Inst. for Advanced Computer Science, Moffett Field, CA.

SMART INSTRUMENTS AND THE NATIONAL COLLABORATORY

BARRY M. LEINER, ed. Nov. 1989 16 p
(Contract NCC2-387)
(NASA-CR-188902; NAS 1.26:188902; RIACS-TR-89-45) Avail: NTIS HC/MF A03 CSCL 14/2

Here, we explore the process of scientific experimental investigation and ask what capabilities are required of the collaboratory to support such investigations. We first look at a number of examples of scientific research being conducted using remote instruments. We then examine the process of such research, asking at each stage what are the required capabilities. We finally integrate these results into a statement of the required set of capabilities needed to support scientific research in the future.
Author

N91-32487# Lawrence Livermore National Lab., CA.

FUTURE DIRECTIONS OF LABORATORY X RAY LASER RESEARCH

M. D. ROSEN 1 May 1991 8 p Presented at the Conference on Short-Wavelength Coherent Radiation: Generation and Application, Monterey, CA, 4-10 Apr. 1991
(Contract W-7405-ENG-48)
(DE91-017088; UCRL-JC-105739; CONF-9104164-6) Avail: NTIS HC/MF A02

We explore ways to make laboratory x-ray lasers and their applications more accessible to a wider community of users. This includes optical pump facilities that are affordable due to progress in optical laser technologies, from nsec 1KJ sources, to 100 fsec

1J tabletop sources. Based on these possibilities, the future for x-ray lasers seems bright.
DOE

N91-32996# Krupp (Fried.) G.m.b.H., Essen (Germany, F.R.).

THE ROLE OF KRUPP FORSCHUNGSINSTITUT IN INTERNATIONAL R AND D COOPERATION

BERND SCHOENWALD and STEPHEN HARRIS *In* its Krupp Technical Reports, Number 2, December 1990 (English Version) p 83-90 Dec. 1990
Avail: NTIS HC/MF A04

International competition begins in the industrial development laboratory. With the aim of making better use of funds expended on research and development the European Community has set up numerous programs designed to encourage a joint approach by industrial partners at the precompetitive stage, particularly in the form of linkups between product developers and users, to ensure optimum application of resources. As a participant in numerous projects, Krupp Forschungsinstitut is a highly regarded partner in this form of European cooperation.
ESA

N91-32997# Krupp Atlas-Elektronik, Bremen (Germany, F.R.).

KNOW-HOW FOR EUROPE

HANS-PETER LEPPIN and THIES WITTIG *In* Krupp (Fried.) G.m.b.H., Krupp Technical Reports, Number 2, December 1990 (English Version) p 91-102 Dec. 1990
Avail: NTIS HC/MF A04

Lively project activity is evolving under the financial and organizational umbrella of the European Community. Now, in the second framework program of ESPRIT, more than 500 companies and scientific establishments have joined together in targeted collaboration in more than 200 projects. The focal area is information technology, a key indicator of social and economic development. The total number of EUREKA projects, which unlike those in ESPRIT are not centrally controlled and financed from Brussels, has risen to more than 400. The research and development projects which Krupp Atlas Elektronik are undertaking with partners from other European countries are discussed.
ESA

N91-33016*# National Academy of Sciences - National Research Council, Washington, DC. Astronomy and Astrophysics Survey Committee.

THE DECADE OF DISCOVERY IN ASTRONOMY AND ASTROPHYSICS

1991 217 p Previously announced in IAA as A91-36824
Sponsored by NASA, Washington Original contains color illustrations
(Contract DE-FG05-89ER-40421; N00173-90-M-9744; NSF AST-89-01685)
(NASA-CR-188226; NAS 1.26:188226; LC-90-21659; ISBN-0-309-04381-6) Copyright Avail: NTIS HC/MF A10; 20 functional color pages CSCL 03/1

A survey of astronomy and astrophysics in the 1990s is presented and a prioritized agenda is offered for space- and ground-based research into the 21st century. In addition to proposing new telescopes for ground and space, the research infrastructure is discussed. The urgent need is emphasized for increased support of individual investigators, for appropriate maintenance and refurbishment of existing facilities, and for a balanced program of space astronomy. The scientific and the technical opportunities of the 1990s are summarized and the technological development is described needed for instruments to be built in the first years of the next century. Also addressed is the suitability of the Moon as an observation site.
Author

N91-33018*# National Radio Astronomy Observatory, Charlottesville, VA.

RADIO ASTRONOMY

KENNETH I. KELLERMANN, DAVID HEESCHEN, DONALD C. BACKER, MARSHALL H. COHEN, MICHAEL DAVIS, IMKE DEPATER, DAVID DEYOUNG, GEORGE A. DULK (Colorado Univ., Boulder.), J. R. FISHER, W. MILLER GOSS et al. *In* National Academy of Sciences/National Research Council, Working Papers:

06 RESEARCH AND DEVELOPMENT

Astronomy and Astrophysics Panel Reports 23 p 1991
Avail: NTIS HC/MF A15 CSCL 03/1

The following subject areas are covered: (1) scientific opportunities (millimeter and sub-millimeter wavelength astronomy; meter to hectometer astronomy; the Sun, stars, pulsars, interstellar masers, and extrasolar planets; the planets, asteroids, and comets; radio galaxies, quasars, and cosmology; and challenges for radio astronomy in the 1990's); (2) recommendations for new facilities (the millimeter arrays, medium scale instruments, and small-scale projects); (3) continuing activities and maintenance, upgrading of telescopes and instrumentation; (4) long range programs and technology development; and (5) social, political, and organizational considerations. Author

N91-33020*# Massachusetts Inst. of Tech., Cambridge.

OPTICAL/IR FROM GROUND

STEPHEN STROM, WALLACE L. W. SARGENT, SIDNEY WOLFF, MICHAEL F. AHEARN, J. ROGER ANGEL, STEVEN V. W. BECKWITH, BRUCE W. CARNEY, PETER S. CONTI, SUZAN EDWARDS, GARY GRASDALEN (Wyoming Univ., Laramie.) et al. /In National Academy of Sciences/National Research Council, Working Papers: Astronomy and Astrophysics Panel Reports 28 p 1991

Avail: NTIS HC/MF A15 CSCL 03/1

Optical/infrared (O/IR) astronomy in the 1990's is reviewed. The following subject areas are included: research environment; science opportunities; technical development of the 1980's and opportunities for the 1990's; and ground-based O/IR astronomy outside the U.S. Recommendations are presented for: (1) large scale programs (Priority 1: a coordinated program for large O/IR telescopes); (2) medium scale programs (Priority 1: a coordinated program for high angular resolution; Priority 2: a new generation of 4-m class telescopes); (3) small scale programs (Priority 1: near-IR and optical all-sky surveys; Priority 2: a National Astrometric Facility); and (4) infrastructure issues (develop, purchase, and distribute optical CCDs and infrared arrays; a program to support large optics technology; a new generation of large filled aperture telescopes; a program to archive and disseminate astronomical databases; and a program for training new instrumentalists) Author

N91-33021*# California Univ., Santa Cruz.

UV-OPTICAL FROM SPACE

GARTH ILLINGWORTH, BLAIR SAVAGE, J. ROGER ANGEL, ROGER D. BLANDFORD, ALBERT BOGGESS, C. STUART BOWYER, GEORGE R. CARRUTHERS, LENNOX L. COWIE, GEORGE A. DOSCHEK, ANDREA K. DUPREE (Harvard Smithsonian Center for Astrophysics, Cambridge, MA.) et al. /In National Academy of Sciences/National Research Council, Working Papers: Astronomy and Astrophysics Panel Reports 31 p 1991

Avail: NTIS HC/MF A15 CSCL 03/1

The following subject areas are covered: (1) the science program (star formation and origins of planetary systems; structure and evolution of the interstellar medium; stellar population; the galactic and extragalactic distance scale; nature of galaxy nuclei, AGNs, and QSOs; formation and evolution of galaxies at high redshifts; and cosmology); (2) implementation of the science program; (3) the observatory-class missions (HST; LST - the 6m successor to HST; and next-generation 16m telescope); (4) moderate and small missions (Delta-class Explorers; imaging astrometric interferometer; small Explorers; optics development and demonstrations; and supporting ground-based capabilities); (5) prerequisites - the current science program (Lyman-FUSE; HTS optimization; the near-term science program; data analysis, modeling, and theory funding; and archives); (6) technologies for the next century; and (7) lunar-based telescopes and instruments. Author

N91-33022*# National Optical Astronomy Lab. Tucson, AZ.

INTERFEROMETRY

STEPHEN RIDGWAY, ROBERT W. WILSON, MITCHELL C. BEGELMAN, PETER BENDER, BERNARD F. BURKE, TIM

CORNWELL, RONALD DREVER, H. MELVIN DYCK, KENNETH J. JOHNSTON, EDWARD KIBBLEWHITE (Chicago Univ., IL.) et al. /In National Academy of Sciences/National Research Council, Working Papers: Astronomy and Astrophysics Panel Reports 22 p 1991

Avail: NTIS HC/MF A15 CSCL 03/1

The following recommended programs are reviewed: (1) infrared and optical interferometry (a ground-based and space programs); (2) compensation for the atmosphere with adaptive optics (a program for development and implementation of adaptive optics); and (3) gravitational waves (high frequency gravitational wave sources (LIGO), low frequency gravitational wave sources (LAGOS), a gravitational wave observatory program, laser gravitational wave observatory in space, and technology development during the 1990's). Prospects for international collaboration and related issues are also discussed. Author

N91-33023*# Washington Univ., Seattle.

HIGH ENERGY FROM SPACE

BRUCE MARGON, CLAUDE CANIZARES, RICHARD C. CATURA, GEORGE W. CLARK, CARL E. FICHEL, HERBERT FRIEDMAN, RICCARDO GIACCONI, JONATHAN E. GRINDLAY, DAVID J. HELFAND, STEPHEN S. HOLT (National Aeronautics and Space Administration, Goddard Space Flight Center, Greenbelt, MD.) et al. /In National Academy of Sciences/National Research Council, Working Papers: Astronomy and Astrophysics Panel Reports 24 p 1991

Avail: NTIS HC/MF A15 CSCL 03/1

The following subject areas are covered: (1) important scientific problems for high energy astrophysics (stellar activity, the interstellar medium in galaxies, supernovae and endpoints of stellar evolution, nucleosynthesis, relativistic plasmas and matter under extreme conditions, nature of gamma-bursts, identification of black holes, active nuclei, accretion physics, large-scale structures, intracluster medium, nature of dark matter, and the X- and gamma-ray background); (2) the existing experimental programs (Advanced X-Ray Astrophysics Facility (AXAF), Gamma Ray Observatory (GRO), X-Ray Timing Explorer (XTE), High Energy Transient Experiment (HETE), U.S. participation in foreign missions, and attached Shuttle and Space Station Freedom payloads); (3) major missions for the 1990's; (4) a new program of moderate missions; (5) new opportunities for small missions; (6) technology development issues; and (7) policy issues. Author

N91-33024*# California Univ., Berkeley.

PARTICLE ASTROPHYSICS

BERNARD SADOULET, JAMES CRONIN, ELENA APRILE, BARRY C. BARISH, EUGENE W. BEIER, ROBERT BRANDENBERGER, BLAS CABRERA, DAVID CALDWELL, GEORGE CASSIDAY, DAVID B. CLINE (California Univ., Los Angeles.) et al. /In National Academy of Sciences/National Research Council, Working Papers: Astronomy and Astrophysics Panel Reports 23 p 1991

Avail: NTIS HC/MF A15 CSCL 03/2

The following scientific areas are reviewed: (1) cosmology and particle physics (particle physics and the early universe, dark matter, and other relics); (2) stellar physics and particles (solar neutrinos, supernovae, and unconventional particle physics); (3) high energy gamma ray and neutrino astronomy; (4) cosmic rays (space and ground observations). Highest scientific priorities for the next decade include implementation of the current program, new initiatives, and longer-term programs. Essential technological developments, such as cryogenic detectors of particles, new solar neutrino techniques, and new extensive air shower detectors, are discussed. Also a certain number of institutional issues (the funding of particle astrophysics, recommended funding mechanisms, recommended facilities, international collaborations, and education and technology) which will become critical in the coming decade are presented. Author

N91-33025*# Chicago Univ., IL.

THEORY AND LABORATORY ASTROPHYSICS

DAVID N. SCHRAMM, CHRISTOPHER F. MCKEE, CHARLES ALCOCK, LOU ALLAMANDOLA, ROGER A. CHEVALIER, DAVID

B. CLINE, ALEXANDER DALGARNO, BRUCE G. ELMGREEN, S. MICHAEL FALL, GARY J. FERLAND (Ohio State Univ., Columbus.) et al. *In National Academy of Sciences/National Research Council, Working Papers: Astronomy and Astrophysics Panel Reports 22 p 1991*

Avail: NTIS HC/MF A15 CSCL 03/2

Science opportunities in the 1990's are discussed. Topics covered include the large scale structure of the universe, galaxies, stars, star formation and the interstellar medium, high energy astrophysics, and the solar system. Laboratory astrophysics in the 1990's is briefly surveyed, covering such topics as molecular, atomic, optical, nuclear and optical physics. Funding recommendations are given for the National Science Foundation, NASA, and the Department of Energy. Recommendations for laboratory astrophysics research are given. Author

N91-33026*# Chicago Univ., IL.

SOLAR ASTRONOMY

ROBERT ROSNER, ROBERT NOYES, SPIRO K. ANTIOCHOS, RICHARD C. CANFIELD, EDWARD L. CHUPP, DRAKE DEMING, GEORGE A. DOSCHEK, GEORGE A. DULK, PETER V. FOUKAL, RONALD L. GILLILAND (Space Telescope Science Inst., Baltimore, MD.) et al. *In National Academy of Sciences/National Research Council, Working Papers: Astronomy and Astrophysics Panel Reports 35 p 1991*

Avail: NTIS HC/MF A15 CSCL 03/1

An overview is given of modern solar physics. Topics covered include the solar interior, the solar surface, the solar atmosphere, the Large Earth-based Solar Telescope (LEST), the Orbiting Solar Laboratory, the High Energy Solar Physics mission, the Space Exploration Initiative, solar-terrestrial physics, and adaptive optics. Policy and related programmatic recommendations are given for university research and education, facilitating solar research, and integrated support for solar research. Author

N91-33027*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, CA.

PLANETARY ASTRONOMY

DAVID MORRISON, DONALD HUNTEN, MICHAEL F. AHEARN, MICHAEL J. S. BELTON, DAVID BLACK, ROBERT A. BROWN, ROBERT HAMILTON BROWN, ANITA L. COCHRAN, DALE P. CRUIKSHANK, IMKE DEPATER (California Univ., Berkeley.) et al. *In National Academy of Sciences/National Research Council, Working Papers: Astronomy and Astrophysics Panel Reports 21 p 1991*

Avail: NTIS HC/MF A15 CSCL 03/1

The authors profile the field of astronomy, identify some of the key scientific questions that can be addressed during the decade of the 1990's, and recommend several facilities that are critically important for answering these questions. Scientific opportunities for the 1990's are discussed. Areas discussed include protoplanetary disks, an inventory of the solar system, primitive material in the solar system, the dynamics of planetary atmospheres, planetary rings and ring dynamics, the composition and structure of the atmospheres of giant planets, the volcanoes of IO, and the mineralogy of the Martian surface. Critical technology developments, proposed projects and facilities, and recommendations for research and facilities are discussed.

Author

N91-33029*# Colorado Univ., Boulder.

POLICY OPPORTUNITIES

RICHARD MCCRAY, JEREMIAH P. OSTRIKER, LOREN W. ACTON, NETA A. BAHCALL, ROBERT C. BLESS, ROBERT A. BROWN, GEOFFREY BURBIDGE, BERNARD F. BURKE, GEORGE W. CLARK, FRANCE A. CORDOVA (Pennsylvania State Univ., University Park.) et al. *In National Academy of Sciences/National Research Council, Working Papers: Astronomy and Astrophysics Panel Reports 18 p 1991*

Avail: NTIS HC/MF A15 CSCL 03/1

Recommendations are given regarding National Science Foundation (NSF) astronomy programs and the NASA Space Astrophysics program. The role of ground based astronomy is

reviewed. The role of National Optical Astronomy Observatories (NOAO) in ground-based night-time astronomical research is discussed. An enhanced Explored Program, costs and management of small and moderate space programs, the role of astrophysics within NASA's space exploration initiative, suborbital and airborne astronomical research, the problems of the Hubble Space Telescope, and astronomy education are discussed. Also covered are policy issues related to the role of science advisory committees, international cooperation and competition, archiving and distribution of astronomical data, and multi-wavelength observations of variable sources. Author

N91-33031*# American Astronomical Society, Washington, DC.

STATUS OF THE PROFESSION

PETER B. BOYCE, CHARLES A. BEICHMAN, HELMUT A. ABT, WENDY HAGEN BAUER, GEOFFREY BURBIDGE, ANITA L. COCHRAN, ROBERT DORFMAN, HUGH HARRIS, ROBERT HAVLEN, CHRISTINE JONES (Smithsonian Astrophysical Observatory, Cambridge, MA.) et al. *In National Academy of Sciences/National Research Council, Working Papers: Astronomy and Astrophysics Panel Reports 19 p 1991*

Avail: NTIS HC/MF A15 CSCL 03/1

The number of astronomers has grown by about 40 percent over the past decade. The number of astronomers with jobs in industry, or with long-term, non-tenured, jobs has increased dramatically compared with traditional faculty positions. The increase in the number of astronomers and the declining share of the NSF budget going to astronomy has led to extreme difficulties in the NSF grant program and in support of the National Observatories. In 1989, direct NASA support of astronomers through the grants program exceeds that of NSF, although the total of the NSF grants program over decade far exceeds that of NASA. Access to major new telescopes will be important issue for the 1990s. US astronomers, who once had a monopoly on telescopes larger than 3 meters, will, by the year 2000, have access to just half of the world's optical telescope area. Author

07

ECONOMICS, COSTS AND MARKETS

Includes Costs and Cost Analysis, Cost Control and Cost Effectiveness, Productivity and Efficiency, Economics and Trade, Financial Management and Finance, Investments, Value and Risk (Monetary), Budgets and Budgeting, Marketing and Market Research, Consumerism, Purchasing, Sales, Commercialization, Competition, Accounting.

A91-10131*# National Aeronautics and Space Administration, Washington, DC.

SPACE STATION FREEDOM COMMERCIAL INFRASTRUCTURE

KEVIN BARQUINERO (NASA, Office of Space Flight, Washington, DC) AIAA, Space Programs and Technologies Conference, Huntsville, AL, Sept. 25-27, 1990. 8 p. (AIAA PAPER 90-3760) Copyright

Several approaches to initiating the provision of the Space Station Freedom (SSF) commercial infrastructure are discussed, including proposals from the private sector, the commercial development of infrastructure, and the commercial operation of infrastructure. Specific options for SSF commercial infrastructure which are currently being studied by NASA are described. One candidate for commercial service is the supplemental power for SSF beyond the Assembly Complete phase. The methods which a company could use in providing supplemental power are discussed, with special attention given to the use of solar dynamic power elements attached to the SSF evolution structure. Another option under evaluation is commercial provision of SSF logistics services using ELVs. I.S.

07 ECONOMICS, COSTS AND MARKETS

A91-10185*# National Aeronautics and Space Administration, Washington, DC.

NASA'S SPACE GRANT PROGRAM

E. JULIUS DASCH (NASA, Washington, DC) AIAA, Space Programs and Technologies Conference, Huntsville, AL, Sept. 25-27, 1990. 5 p.

(AIAA PAPER 90-3838) Copyright

Program descriptions are provided for both phases of the U.S. NASA Space Grant College and Fellowship Program. While Phase I consisted of the designation of 21 universities and university consortia as Space Grant Colleges/Consortia intended to maintain a balanced program of research, curriculum, and public service, the recently implemented Phase II is designed to broaden participation in the Space Grant Program by targeting states that are currently not as involved in NASA programs as are the states for which Phase one is constructed. The Phase II/Capability Enhancement Grants (CEG) thus provide grants to states with little or no present NASA involvement, with planning grants expected to lead to substantive grant proposals. States are to compete in either the Programs Grants category or the CEG category, with only one proposal accepted from each state. Program Grants, CEGs, and Fellowship requirements are outlined.

L.K.S.

A91-10945#

MANNED SPACE SYSTEMS UTILIZATION OF PRODUCT ASSURANCE AND SUPPORTABILITY TECHNOLOGY

T. L. CARVALHO (Rockwell International Corp., Space Transportation Systems Div., Downey, CA) IN: Space Logistics Symposium, 3rd, Colorado Springs, CO, Apr. 30-May 2, 1990, Proceedings. Huntsville, AL, Society of Logistics Engineers, 1990, 13 p. refs

The paper reviews how product assurance and supportability technologies are applied to the design and development of manned space systems. Rising costs by industry and government, linked with political and ensuing budgetary crises, have led to reductions in applications of technology improvements. The benefits and advisability of this reduction are discussed together with the cost savings and benefits (short-term and long-term) of product assurance and supportability technologies. It is shown that, even though the principal space programs are providing many new and useful technology tools and breakthroughs, they are not receiving the maximum return on their investments.

R.E.P.

A91-13727#

PHILOSOPHY OF THE GERMAN SPACE TECHNOLOGY PROGRAMME FOR SPACE DEMONSTRATION AND THE TUBSAT A EXAMPLE

A. EXNER, J. MAJUS, and U. RENNER IAF, International Astronautical Congress, 41st, Dresden, Federal Republic of Germany, Oct. 6-12, 1990. 34 p.

(IAF PAPER 90-002)

The future marketing of the German Space Technology Program by in-orbit demonstration is discussed, using TUBSAT A as an example. Launch opportunities, ejection mechanisms, satellite equipment and structure, sensors, and ground stations are discussed and illustrated as they are relevant to in-orbit demonstration. The orbits, launch and satellite costs, and time for development and manufacture for a TUBSAT-A demonstration are given.

C.D.

A91-14115#

AN ANALYSIS ON SPACE COMMERCIALIZATION IN JAPAN

YOSHIKI MORINO and FUMIO KODAMA (Science and Technology Agency, Tokyo, Japan) IAF, International Astronautical Congress, 41st, Dresden, Federal Republic of Germany, Oct. 6-12, 1990. 11 p

(IAF PAPER 90-614) Copyright

In the 1980s, the world space industry has reached a new level of space commercialization, from which self-supporting mechanisms of the free market economy could be activated and human activities in space could be accelerated. From this point of view, it seems very important to investigate the possible

contribution of Japanese industry, which has shown unique technological characteristics in the world economy. An effort is made to find a possible role for Japanese industries in the future expansion of world space commercialization. By looking into varied activities of the Japanese space industry, promising possibilities were found for Japanese companies to formulate new design and development philosophies for space technology by drawing on their unique expertise in civil technology.

Author

A91-14116#

GLOBAL COMMERCIALIZATION OF LAUNCH SERVICES - SHORTCOMINGS IN CURRENT POLICIES AND PROSPECTS FOR THE FUTURE

MARK R. ODERMAN (CSP Associates, Inc., Cambridge, MA) IAF, International Astronautical Congress, 41st, Dresden, Federal Republic of Germany, Oct. 6-12, 1990. 10 p.

(IAF PAPER 90-615) Copyright

This paper discusses the origins and problems confronting the commercial launch services industry. Current problems are traced to the non-economic reasons why nations fund launch vehicle programs, the limited prospects for commercial market growth in the next decade, the varying levels of support which public sector organizations continue to provide commercial entities, and the difficulty of integrating non-market economies into the global marketplace. The article then projects three trends for the industry in the 1990s: market departure by uncompetitive firms, increased government intervention to maintain firms in the market, and the potential for transnational rationalization of global launch systems.

Author

A91-15520

RADARSAT INTERNATIONAL INC. - COMMERCIAL DISTRIBUTION OF RADARSAT PRODUCTS

D. R. INKSTER (Intera Technologies, Ltd., Calgary, Canada) IN: Quantitative remote sensing: An economic tool for the Nineties; Proceedings of IGARSS '89 and Canadian Symposium on Remote Sensing, 12th, Vancouver, Canada, July 10-14, 1989. Volume 1. New York, Institute of Electrical and Electronics Engineers, 1989, p. 204-207.

Copyright

A91-20485#

SPACE STATION CHANGES ITS COURSE

ERIC J. LERNER Aerospace America (ISSN 0740-722X), vol. 29, Jan. 1991, p. 12-15.

Copyright

The series of complications that has beset the Space Station project, culminating in a Congressional order for NASA to redirect the entire project, is reviewed. In addition to cutting \$6 billion from the Station's budget over the next five years, the House and Senate have written clear directives into NASA's FY91 appropriations bill stating that the Station be built one stage at a time, not all at once as NASA had intended. Congress has directed that the first phase be devoted to microgravity research and should be only human-tended, visited periodically by astronauts, but otherwise flying unmanned with automated experiments. Advantages and complications incurred by such changes are discussed. One suggested way for NASA to operate long duration human biology experiments in the absence of a fully developed Space Station program is to place appropriate U.S. instrumentation and/or astronauts aboard the space station Mir.

L.K.S.

A91-22171

CAN THE U.S. INDUSTRY RETAIN ITS LEADERSHIP?

PIERRE CONDOM Aerospace World (ISSN 0983-1592), vol. 4, Dec. 1990, p. 13-17.

Copyright

It is nearly impossible to quantify accurately the changes in the competitive position of the U.S. aerospace industry in comparison to its rivals. The tremendous swings of the dollar exchange rate make difficult any comparison between results quoted in the different national currencies or in ECU. Nonetheless, all the indications are that the U.S. market share has declined

slightly over the last decade. According to the European Commission, Europe has approximately one-third of the world market for business and light aircraft, two-thirds of the commuter aircraft market, and almost one-third of the helicopter market. In addition, while the U.S. industry loses ground in the civil sector, government defense spending is decreasing. The principal asset of the U.S. aerospace industry is its technological superiority, but the gap between the U.S. industry and its rivals is not as wide as it was at one time. The U.S. Aerospace Industries Association established the National Center of Advanced Technologies, a nonprofit foundation responsible for integrating and coordinating the program concerning key technologies for the 1990s and assisting in its implementation. R.E.P.

A91-27579* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.

A PROPOSAL FOR RISK SHARING IN THE DEVELOPMENT OF A LUNAR OXYGEN PLANT

MICHAEL B. DUKE (NASA, Johnson Space Center, Houston, TX) and MEAD TREADWELL IN: Engineering, construction, and operations in space II; Proceedings of Space 90, the Second International Conference, Albuquerque, NM, Apr. 22-26, 1990. Vol. 1. New York, American Society of Civil Engineers, 1990, p. 41-49. Copyright

The production of lunar oxygen for use in a NASA lunar outpost program could provide a profitable investment for nongovernment development, savings for government, and an initiation of a new resource of capital financing for space industrialization. A joint endeavor to share development risks between government and nongovernment investment is proposed, based on some early assessments of technical and financial feasibility for the project. Successful initial negotiations between government and nongovernment investors can establish the requirements for financing the project with private funds. Author

A91-29029

THE PEACE DIVIDEND - NEW OPTIONS FOR FUNDING SPACE EXPLORATION, RESEARCH, AND DEVELOPMENT

J. M. SCHELL Journal of Practical Applications in Space (ISSN 1046-8757), vol. 2, Fall 1990, p. 19-32. refs Copyright

It is pointed out that the dramatic transformations taking place in the societies and economies of the countries of the Eastern Bloc have a great impact on the U.S. policy of defense budgeting. It is projected that, as there is no more need to maintain current defense levels, the estimated savings in 1991-1993 period are expected to reach \$94 billion, \$16 billion resulting in a peace dividend. These funds might be used for research and development in space. The real benefits of space exploration and actual applications of space technologies such as computer enhanced imaging of alien landscapes, the mapping and plotting of celestial trajectories as well as communication, navigation, earth remote sensing and the use of the microgravity environment are discussed. A manned Mars mission is mentioned as the largest and the most interesting future project. O.G.

A91-29696#

TEST COST SAVINGS THROUGH RISK ANALYSIS

ALFRED M. FEILER and ROBERT GEMINDER (Log/An, Inc., Los Angeles, CA) IN: Aerospace Testing Seminar, 12th, Manhattan Beach, CA, Mar. 13-15, 1990, Proceedings. Mount Prospect, IL, Institute of Environmental Sciences, 1990, p. 25-28. refs

This paper addresses test program cost savings through application of program risk management procedures. Over the past few years, program risk analysis has become a requirement for most DoD acquisition programs. Although the technique has significantly contributed to reduction of cost/schedule/technical risks, relatively little attention has been given to another attainable benefit: direct reduction of test program costs. This paper includes a discussion of test planning, scheduling and resourcing. It presents examples to illustrate how expenditures for these resources (labor, equipment, facilities and test articles) can be minimized through use of probabilistic plan analysis. Author

A91-41691#

VALUE ANALYSIS APPLICATION AND RESULTS

L. D. REBER (Aerojet, Propulsion Div., Sacramento, CA) AIAA, SAE, ASME, and ASEE, Joint Propulsion Conference, 27th, Sacramento, CA, June 24-26, 1991. 6 p. (AIAA PAPER 91-2063) Copyright

The value analysis methodology developed by L.D. Miles during World War II enhances a product's value, while reducing its production costs, through the study of its intended functions. Attention is presently given to a value-management program case study at a major rocket-propulsion systems manufacturer, which demonstrates the use of a centrally located program office supported by personnel from other departments. The relationship of value analysis to total quality management techniques is explored. O.C.

A91-43273

SUB-CONTRACTORS PLAY NEW STRATEGIC ROLES

PHILIP BUTTERWORTH-HAYES and J. R. WILSON Interavia Aerospace Review (ISSN 0020-6512), vol. 46, July 1991, p. 30-32, 34, 36-38. Copyright

An overview is presented of the manner in which U.S. aircraft manufacturers have approached their outside suppliers, though sharply different from each other, reflecting the recognition they have given to the changing nature of international manufacturing and marketing. A breakdown of major civilian transport aircraft by component parts and subcontracting manufacturers is provided. The relationship between the major civil airline airframe manufacturers and their suppliers is evolving into growing complex structures, with suppliers themselves making intricate arrangements with their own subcontractors. Specific examples of contractual arrangements are described for European, Asian, and other international manufacturers as well as those in the U.S.A. R.E.P.

A91-43348#

SPEEDING PAYMENTS TO INDUSTRY - THE ESA SOLUTION

C. W. PRIDGEON and S. G. KAHN (ESA, Directorate of Administration, Noordwijk, Netherlands) ESA Bulletin (ISSN 0376-4265), no. 66, May 1991, p. 104-108. Copyright

ESA payment conditions for prime contracts are designed to provide a reasonable and contractually justified cash flow to industry. Nevertheless, payments to lower-tier contractors have often been very much delayed due to the many levels of invoice approval required within the Industrial Consortia. Investigation of complaints concerning these delays has shown that the Agency almost invariably has paid within the due period, i.e. 30 days after receipt of the invoice from industry. By the time the invoice has reached the Agency, however, a long period has generally elapsed since it was originally raised by the lower-tier contractor. Author

A91-45317#

FUNDING - A UNIFIED APPROACH

TOM WARWICK (Pratt and Whitney Group, West Palm Beach, FL) Journal of Aircraft (ISSN 0021-8669), vol. 28, July 1991, p. 417-426. Previously cited in issue 18, p. 3142, Accession no. A88-44805. refs Copyright

A91-45375#

HELICOPTER CONFIGURATION SELECTION - A PROCUREMENT POINT OF VIEW

P. A. GIULIANI (Ministero della Difesa, Rome, Italy) European Rotorcraft Forum, 15th, Amsterdam, Netherlands, Sept. 12-15, 1989, Paper. 15 p.

The present study addresses the balancing of cost effectiveness, against available resources as the prime consideration in choosing the composition of a helicopter fleet and the configuration of its element. Costs are considered in relation to the present tendency to overdesign in terms of complexity, redundancy, and sophistication. It is suggested that appropriate operational, technical and economic evaluations be iterated from the outset in order to

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verify and assess a system's technical feasibility, the optical cost-effectiveness trade-off, the overall life-cycle-costs affordability of possible solutions, and flexibility. It is concluded that the optimal decision process leading to the selection of new advanced complex systems should be based on accurate quantitative analysis of all relevant aspects. If integrated with cost-analysis algorithms, system 'test-beds', scenario simulators, and the like could potentially constitute a first step toward a 'standard' evaluation and selection methodology. P.D.

A91-48168

ASSESSING STRATEGIES FOR OBTAINING ADVANCED ENGINEERING TECHNOLOGIES WITH HIGHLY UNCERTAIN BENEFITS

ROGER J. GAGNON (Wake Forest University, Winston-Salem, NC) IEEE Transactions on Engineering Management (ISSN 0018-9391), vol. 38, Aug. 1991, p. 210-223. Research supported by Wake Forest University. refs

Copyright

Comprehensive financial methods are presented which can evaluate alternative strategies for obtaining advanced engineering technologies, such as CAD/CAE, when the values of the benefits are highly uncertain or even unknown. The methods integrate traditional financial discounting procedures for known cost data with expert opinions for estimating benefit values and incorporate engineering performance improvement, project volumes ranging from one to infinity, various time horizons, and a comprehensive sensitivity analysis. Realistic strategies and actual case data are used to illustrate the procedures. Impacts from project volume, project benefit values and the selection of the financial evaluation criterion are discussed. I.E.

A91-50177

CURRENT ISSUES IN AIRCRAFT FINANCE

MICHAEL D. RICE (Reboul, MacMurray, Hewitt, Maynard & Kristol, New York) Journal of Air Law and Commerce (ISSN 0021-8642), vol. 56, Summer 1991, p. 1027-1092. refs

Copyright

A detailed discussion of aircraft finance is presented. The topics addressed include: debt financing, lease financing, cross-border leasing, registration and recordation, the effect of recordation, international effects, bankruptcy, event risk. C.D.

A91-54396

QUALITY COSTING AT BRITISH AEROSPACE DYNAMICS - A CASE STUDY

M. G. HESFORD (British Aerospace /Dynamics/, Ltd., Stevenage, England) and B. G. DALE (University of Manchester Institute of Science and Technology, England) Institution of Mechanical Engineers, Proceedings, Part G - Journal of Aerospace Engineering (ISSN 0954-4100), vol. 205, no. G1, 1991, p. 53-57. refs

Copyright

An approach to the development of a quality costing model based on the BS 6143 standard is examined, and the difficulties associated with the development of the model are summarized. These include the necessary tradeoff between accuracy and utility, determining the cost of engineering changes, obtaining quality cost data from the accounting system, and quality cost definitions. Some actual results demonstrating the utility of the model are included. V.L.

N91-10138# Rolls-Royce Ltd., Derby (England).

INDUSTRIAL APPLICATIONS AND MARKETS FOR CERAMIC MATRIX COMPOSITES

DAVID A. CLARKE 28 Mar. 1990 31 p Presented at Short Course on Advanced Ceramic and Metallic Composites, Cambridge, England, 25-28 Mar. 1990

(PNR-90753; ETN-90-97957) Copyright Avail: NTIS HC/MF A03

An assessment of the ceramic matrix composites market is presented. The aim is focused on the use of particulate and fiber reinforced ceramics for cutting tools, space structures and heat engines. The types of materials in use and the reasons for their

selection are discussed. An assessment of what industry must now do to realize the full potential of ceramic matrix composites materials in a wide range of market roles is presented. ESA

N91-10139# Rolls-Royce Ltd., Derby (England).

MULTI INDUSTRY APPLICATION OF ADVANCED MATERIALS

JOHN F. COPLIN 31 May 1989 20 p Presented in Japan, 31 May 1989

(PNR-90764; ETN-90-97963) Copyright Avail: NTIS HC/MF A03

Applications and market evolution of materials for aero engines are summarized. Early days market was provided by military engines. Civil airline market contributed to the market pull. Extra market pull can be provided by automotive industry. Technology developments, and production of high temperature/high resistance materials require new market pulls. At a time when military spending is going down in real money, and when a lower portion is going into aircraft and engines, it is found that lower cost machines made possible by ceramics and metal matrix developments can replace conventional concepts in the future. ESA

N91-10197# Rolls-Royce Ltd., Derby (England).

ENGINEERING DESIGN: A POWERFUL INFLUENCE ON THE BUSINESS SUCCESS ON MANUFACTURING INDUSTRY

JOHN F. COPLIN 25 Aug. 1990 47 p Presented at I Mech E International Conference on Engineering Design, Harrogate, England, 22-25 Aug. 1989

(PNR-90763; ETN-90-97962) Copyright Avail: NTIS HC/MF A03

Engineering design, one of the most powerful forces in producing a package which matches market need, is discussed. It is essentially a detailed planning process backed by analysis and demonstration. The need for innovation to achieve competitive edge and profitability is considered. Innovation contains risk which must be controlled before substantial investment is made. The high rate of change of technology gives rise to the need for good training and retraining. Benefits which offsets costs at the time of occurring that cost are reached. ESA

N91-10611*# International Business Machines Corp., Houston, TX.

KNOWLEDGE-BASED ASSISTANCE IN COSTING THE SPACE STATION DMS

TROY HENSON and KYLE RONE /n NASA, Goddard Space Flight Center, Proceedings of the Thirteenth Annual Software Engineering Workshop 18 p Nov. 1988

Avail: NTIS HC/MF A16 CSCL 09B

The Software Cost Engineering (SCE) methodology developed over the last two decades at IBM Systems Integration Division (SID) in Houston is utilized to cost the NASA Space Station Data Management System (DMS). An ongoing project to capture this methodology, which is built on a foundation of experiences and lessons learned, has resulted in the development of an internal-use-only, PC-based prototype that integrates algorithmic tools with knowledge-based decision support assistants. This prototype Software Cost Engineering Automation Tool (SCEAT) is being employed to assist in the DMS costing exercises. At the same time, DMS costing serves as a forcing function and provides a platform for the continuing, iterative development, calibration, and validation and verification of SCEAT. The data that forms the cost engineering database is derived from more than 15 years of development of NASA Space Shuttle software, ranging from low criticality, low complexity support tools to highly complex and highly critical onboard software. Author

N91-10795*# Research Inst. for Advanced Computer Science, Moffett Field, CA.

SPACE MARKET MODEL SPACE INDUSTRY INPUT-OUTPUT MODEL

ROBERT F. HODGIN and ROBERTO MARCHESINI Mar. 1987 39 p

(Contract NCC9-16)

(NASA-CR-187252; NAS 1.26:187252) Avail: NTIS HC/MF A03
CSCL 05A

The goal of the Space Market Model (SMM) is to develop an information resource for the space industry. The SMM is intended to contain information appropriate for decision making in the space industry. The objectives of the SMM are to: (1) assemble information related to the development of the space business; (2) construct an adequate description of the emerging space market; (3) disseminate the information on the space market to forecasts and planners in government agencies and private corporations; and (4) provide timely analyses and forecasts of critical elements of the space market. An Input-Output model of market activity is proposed which are capable of transforming raw data into useful information for decision makers and policy makers dealing with the space sector. Author

N91-12385*# Research Inst. for Advanced Computer Science, Moffett Field, CA.

SPACE MARKET MODEL DEVELOPMENT PROJECT

PETER C. BISHOP Jun. 1987 78 p

(Contract NCC9-16)

(NASA-CR-187249; NAS 1.26:187249) Avail: NTIS HC/MF A05
CSCL 05/1

The objectives of the research program, Space Market Model Development Project, (Phase 1) were: (1) to study the need for business information in the commercial development of space; and (2) to propose a design for an information system to meet the identified needs. Three simultaneous research strategies were used in proceeding toward this goal: (1) to describe the space business information which currently exists; (2) to survey government and business representatives on the information they would like to have; and (3) to investigate the feasibility of generating new economical information about the space industry. Author

N91-12587# Institute for Defense Analyses, Alexandria, VA. Cost Analysis and Research Div.

TRENDS IN A SAMPLE OF DEFENSE AIRCRAFT

CONTRACTORS' COSTS Final Report, Oct. 1989 - Aug. 1990

JAMES D. MCCULLOUGH and STEPHEN J. BALUT Aug. 1990
23 p

(AD-A225663; AD-E501258; IDA-D-764; IDA/HQ-90-35426)

Avail: NTIS HC/MF A03 CSCL 05/3

This paper contains information on historical trends in direct and indirect costs for four defense aircraft contractors: General Dynamics-Fort Worth Division, Grumman Aerospace Corporation, McDonnell Aircraft Company, and Northrop Aircraft Company. The trends are presented for those four contractors in aggregate rather than individually. The paper concludes with a look at what these trends may mean in terms of future costs. GRA

N91-12588# Institute for Defense Analyses, Alexandria, VA.

ANALYSES OF A COPRODUCTION ACQUISITION STRATEGY FOR THE LIGHT HELICOPTER PROGRAM (LH) Final Report, Dec. 1988 - Apr. 1990

WILLIAM J. E. SHAFER, BARBARA J. JUNGHANS, NEANG I. OM, PAUL R. PALMER, JR., and JOSEPH W. STAHL Apr. 1990
60 p

(Contract MDA903-89-C-0003)

(AD-A226109; AD-E501264; IDA-P-2385; IDA/HQ-90-35400)

Avail: NTIS HC/MF A04 CSCL 01/3

The purpose of this study was to assess the potential cost savings of using a coproduction versus a competition acquisition strategy for the U.S. Army's Light Helicopter (LH) program (formerly LHX). The Army's Baseline Cost Estimate (BCE) is examined and reproduced before adjustments are made based on changes in the methodology used by the Army. The analysis of costs covers all production costs and considers the time value of money, the production schedule, and sustainment costs. Based on their analysis, the authors conclude that coproduction would be the least-cost acquisition strategy. GRA

N91-12752# Oak Ridge National Lab., TN. Energy Div.

ADVANCED MATERIALS: INFORMATION AND ANALYSIS NEEDS

T. RANDALL CURLEE, SUJIT DAS, RUSSELL LEE, and DAVID TRUMBLE Sep. 1990 85 p

(Contract DE-AC05-84OR-21400)

(DE91-001017; ORNL/TM-11593) Avail: NTIS HC/MF A05

This report presents the findings of a study to identify the types of information and analysis that are needed for advanced materials. The project was sponsored by the U.S. Bureau of Mines (BOM). It includes a conceptual description of information needs for advanced materials and the development and implementation of a questionnaire on the same subject. This report identifies twelve fundamental differences between advanced and traditional materials and discusses the implications of these differences for data and analysis needs. Advanced and traditional materials differ significantly in terms of physical and chemical properties. Advanced material properties can be customized more easily. The production of advanced materials may differ from traditional materials in terms of inputs, the importance of by-products, the importance of different processing steps (especially fabrication), and scale economies. The potential for change in advanced materials characteristics and markets is greater and is derived from the marriage of radically different materials and processes. In addition to the conceptual study, a questionnaire was developed and implemented to assess the opinions of people who are likely users of BOM information on advanced materials. The results of the questionnaire, which was sent to about 1000 people, generally confirm the propositions set forth in the conceptual part of the study. The results also provide data on the categories of advanced materials and the types of information that are of greatest interest to potential users. DOE

N91-12856# Office of Naval Research European Office, FPO New York, NY.

EUROPEAN TELECOMMUNICATIONS CONFERENCE.

STRATEGIC PLANNING FOR THE 1990S

J. F. BLACKBURN 29 Jun. 1990 14 p Conference held in Brussels, Belgium, 9-10 May 1990

(AD-A225521; ONREUR-90-6-C) Avail: NTIS HC/MF A03
CSCL 25/5

The European Telecommunications Conference Strategic Planning for the 1990s provided information to delegates and their companies on strategic planning for the European market, particularly after the advent of the European Single Market at the end of 1992. The conference objective was to examine the impact of the initiatives of the European Commission (EC) and the changing attitudes to service provision by public and private sector organizations on industry and marketing. Organized by Blenheim Online and Logica, 40 delegates attended this conference, mainly from Europe, but with a few from the U.S. The papers were designed to illuminate such questions as emerging market sectors, impact of U.S. telecommunications organizations in Europe, mergers and acquisition, standards, and value-added services. GRA

N91-13092*# MountainNet, Dellslow, WV.

ADANET RESEARCH PROJECT Final Report

R. MICHAEL DIGMAN Aug. 1988 183 p Prepared for Houston Univ., Clear Lake, TX

(Contract NCC9-16)

(NASA-CR-187389; NAS 1.26:187389) Avail: NTIS HC/MF A09
CSCL 09/2

The components necessary for the success of the commercialization of an Ada Technology Transition Network are reported in detail. The organizational plan presents the planned structure for services development and technical transition of AdaNET services to potential user communities. The Business Plan is the operational plan for the AdaNET service as a commercial venture. The Technical Plan is the plan from which the AdaNET can be designed including detailed requirements analysis. Also contained is an analysis of user fees and charges, and a proposed user fee schedule. B.G.

07 ECONOMICS, COSTS AND MARKETS

N91-13348*# Research Inst. for Advanced Computer Science, Moffett Field, CA.

SPACE MARKET MODEL DEVELOPMENT PROJECT, PHASE 3

PETER C. BISHOP and GARY P. HAMEL Jun. 1989 67 p
(Contract NCC9-16)

(NASA-CR-187251; NAS 1.26:187251) Avail: NTIS HC/MF A04
CSCL 05/1

The results of a research project investigating information needs for space commercialization is described. The Space Market Model Development Project (SMMDP) was designed to help NASA identify the information needs of the business community and to explore means to meet those needs. The activity of the SMMDP is reviewed and a report of its operation via three sections is presented. The first part contains a brief historical review of the project since inception. The next part reports results of Phase 3, the most recent stage of activity. Finally, overall conclusions and observations based on the SMMDP research results are presented. Author

N91-13349*# Research Inst. for Advanced Computer Science, Moffett Field, CA.

SPACE MARKET MODEL DEVELOPMENT PROJECT, PHASE 2

PETER C. BISHOP Jun. 1988 41 p

(Contract NCC9-16)

(NASA-CR-187250; NAS 1.26:187250) Avail: NTIS HC/MF A03
CSCL 05/1

The results of the prototype operations of the Space Business Information Center are presented. A clearinghouse for space business information for members of the U.S. space industry composed of public, private, and academic sectors was conducted. Behavioral and evaluation statistics were recorded from the clearinghouse and the conclusions from these statistics are presented. Business guidebooks on major markets in space business are discussed. Proprietary research and briefings for firms and agencies in the space industry are also discussed. Author

N91-13350*# National Aeronautics and Space Administration, Washington, DC.

SUMMARY DATA ON ALL NASA PROCUREMENT ACTIONS

Semiannual Procurement Report, FY 1 Oct. 1989 - 31 Mar.

1990

1990 30 p

(NASA-TM-103447; NAS 1.15:103447) Avail: NTIS HC/MF A03
CSCL 05/1

Summary data on all NASA procurement actions and detailed information on contracts, grants, agreements, and other procurements over \$25,000 awarded by NASA during the first six months on fiscal year 1990 are presented. Areas addressed include competition in NASA awards, awards to business firms, awards to educational and other nonprofit institutions, contract for operation of Jet Propulsion Laboratory, and awards through other government agencies. Other topics covered are the U.S. geographical distribution of awards, awards placed outside the U.S., and procurement activity by installation. Author

N91-15195# SPOT Image Corp., Toulouse (France).

SPOT IMAGE

ANTOINE DELEVISMIREPOIX In ESA, Some Papers from the Seminar Mirando al Espacio p 13-22 Jun. 1990

Copyright Avail: NTIS HC/MF A05; EPD, ESTEC, Noordwijk, Netherlands, HC 30 Dutch guilders

The commercialization of SPOT products is discussed, including the technical specifications and commercial parameters of standard and special SPOT products. Services, programming, commercial network, and the market situation are also discussed. The conclusions are optimistic and show how the needs of users determine SPOT strategy. ESA

N91-15627*# Oakland Univ., Rochester, MI.

A PROPOSAL TO EXTEND OUR UNDERSTANDING OF THE GLOBAL ECONOMY

ROBBIN R. HOUGH and MANFRED EHLERS (Maine Univ.,

Orono.) In NASA, Goddard Space Flight Center, Multisource Data Integration in Remote Sensing p 135-140 Jan. 1991

Avail: NTIS HC/MF A08 CSCL 13/2

Satellites acquire information on a global and repetitive basis. They are thus ideal tools for use when global scale and analysis over time is required. Data from satellites comes in digital form which means that it is ideally suited for incorporation in digital data bases and that it can be evaluated using automated techniques. The development of a global multi-source data set which integrates digital information is proposed regarding some 15,000 major industrial sites worldwide with remotely sensed images of the sites. The resulting data set would provide the basis for a wide variety of studies of the global economy. The preliminary results give promise of a new class of global policy model which is far more detailed and helpful to local policy makers than its predecessors. The central thesis of this proposal is that major industrial sites can be identified and their utilization can be tracked with the aid of satellite images. Author

N91-16334*# General Electric Co., Philadelphia, PA. Astro Space Div.

DEFINITION AND PRELIMINARY DESIGN OF THE LASER ATMOSPHERIC WIND SOUNDER (LAWS) PHASE 1. VOLUME 3: PROGRAM COST ESTIMATES Final Report

15 May 1990 50 p

(Contract NAS8-37589)

(NASA-CR-184073; NAS 1.26:184073) Avail: NTIS HC/MF A03
CSCL 14/2

Cost estimates for phase C/D of the laser atmospheric wind sounder (LAWS) program are presented. This information provides a framework for cost, budget, and program planning estimates for LAWS. Volume 3 is divided into three sections. Section 1 details the approach taken to produce the cost figures, including the assumptions regarding the schedule for phase C/D and the methodology and rationale for costing the various work breakdown structure (WBS) elements. Section 2 shows a breakdown of the cost by WBS element, with the cost divided in non-recurring and recurring expenditures. Note that throughout this volume the cost is given in 1990 dollars, with bottom line totals also expressed in 1988 dollars (1 dollar(88) = 0.93 1 dollar(90)). Section 3 shows a breakdown of the cost by year. The WBS and WBS dictionary are included as an attachment to this report. Author

N91-16425# Beleidscommissie Remote Sensing, Delft (Netherlands).

EXTRACTION OF MARKETABLE INFORMATION FROM ERS-1 DATA

C. F. DEVALK, G. J. WENSINK, R. W. VANSWOL, and J. C. VENEMA (National Aerospace Lab., Amsterdam, Netherlands) Jun. 1990 83 p

(Contract BCRS PROJ. CO-2.20)

(BCRS-90-03; ETN-91-98463) Avail: NTIS HC/MF A05

Ways in which marketable information can be extracted from ERS-1 data are discussed. Recommendations for ways of processing and disseminating the data are presented. Use of ERS-1 data to support marine and coastal activities, for instance, requires integration of ERS-1 observations with conventional observations to generate a set of wind, wave and flow data covering the requirements for a wide range of applications. A functional design of an information system providing easy access to ERS-1 data in generic form is presented. A system definition study to specify the functional and technical requirements of the system and arrive at a well founded cost estimate, is described. ESA

N91-16831# Department of Energy, Washington, DC. Office of Small and Disadvantaged Business Utilization.

REPORT TO CONGRESS ON THE SMALL BUSINESS PROGRAM

1989 53 p

(DE91-004622; DOE/MA-0422) Avail: NTIS HC/MF A04

The Department of Energy's (DOE) Small Business Program is characterized by its diligent involvement in the procurement process to enhance participation by small businesses, small disadvantaged

businesses, labor surplus area firms, and women-owned businesses. The DOE's primary means of securing an equitable proportion of transactions for these businesses are total set-asides, partial set-asides, 8(a) sole source procurements, and 8(a) competitive procurements. Throughout the DOE's infrastructure, all DOE organizational elements are committed to successfully implement the Small Business Program. The Department's commitment includes developing substantial opportunities in both prime contracting and subcontracting and encompasses special preference programs to enhance awards to such businesses.

DOE

N91-18894*# National Aeronautics and Space Administration, Washington, DC.

NASA COMMERCIAL PROGRAMS Progress Report, 1989

1990 31 p Original contains color illustrations - (NASA-TM-103410; NAS 1.15:103410) Avail: NTIS HC/MF A03; 21 functional color pages CSCL 05/1

Highlights of NASA-sponsored and assisted commercial space activities of 1989 are presented. Industrial R and D in space, centers for the commercial development of space, and new cooperative agreements are addressed in the U.S. private sector in space section. In the building U.S. competitiveness through technology section, the following topics are presented: (1) technology utilization as a national priority; (2) an exploration of benefits; and (3) honoring Apollo-Era spinoffs. International and domestic R and D trends, and the space sector are discussed in the section on selected economic indicators. Other subjects included in this report are: (1) small business innovation; (2) budget highlights and trends; (3) commercial programs management; and (4) the commercial programs advisory committee. K.S.

N91-18895*# National Aeronautics and Space Administration, Washington, DC.

SELLING TO NASA

1990 58 p Original contains color illustrations (NASA-NP-123; NAS 1.83:123) Avail: NTIS HC/MF A04; 39 functional color pages CSCL 05/1

This handbook is designed to promote a better understanding of NASA's interests and the process of doing business with NASA. The document is divided into the following sections: (1) this is NASA; (2) the procurement process; (3) marketing your capabilities; (4) special assistance programs; (5) NASA field installations; (6) sources of additional help; (7) listing of NASA small/minority business personnel; and (8) NASA organization chart. K.S.

N91-18983*# University of Southern Mississippi, Hattiesburg. Dept. of Management Information Systems.

NASA ACCOUNTING AND FINANCIAL INFORMATION SYSTEM (NAFIS): A CRITICAL ASSESSMENT OF THE SYSTEMS DEVELOPMENT METHODOLOGY

ERNEST PRESTON GOSS In Alabama Univ., Research Reports: 1990 NASA/ASEE Summer Faculty Fellowship Program 5 p Oct. 1990

(Contract NAS8-37200)

Avail: NTIS HC/MF A16 CSCL 05/2

The NASA Accounting and Financial Information System (NAFIS) systems development methodology was examined. The recommendations are briefly outlined. B.G.

N91-19511# American Public Power Association, Washington, DC.

COMPLEAT (COMMUNITY-ORIENTED MODEL FOR PLANNING LEAST-COST ENERGY ALTERNATIVES AND TECHNOLOGIES): A PLANNING TOOL FOR PUBLICLY OWNED ELECTRIC UTILITIES

Sep. 1990 153 p

(Contract DE-FG01-87CE-27462)

(DE91-006955; DOE/CE-27462/T1) Avail: NTIS HC/MF A08

The community-oriented model for planning least-cost energy alternatives and technologies (COMPLEAT) is an electric utility planning model designed to be principally used by publicly owned electric utilities and agencies serving such utilities. As a model,

COMPLEAT is significantly more full-featured and complex than called out in APPA's original plan and proposal to DOE. The additional complexity grew out of a series of discussions early in the development schedule, in which it became clear to APPA staff and advisors that the simplicity characterizing the original plan, while highly desirable in terms of utility applications, was not achievable if practical utility problems were to be addressed. The project teams settled on Energy 20/20, an existing model developed by Dr. George Backus of Policy Assessment Associates, as the best candidate for the kinds of modifications and extensions that would be required. The remainder of the project effort was devoted to designing specific input data files, output files, and user screens and to writing and testing the compute programs that would properly implement the desired features around Energy 20/20 as a core program. This report presents in outline form, the features and user interface of COMPLEAT. DOE

N91-19969# Committee on Appropriations (U.S. Senate).

PROBLEMS AT NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

Washington GPO 1991 63 p Special hearing before the Committee on Appropriations, 101st Congress, 2d Session, 18 Jul. 1990

(S-HRG-101-1146; GPO-36-778) Avail: Committee on Appropriations, Senate, Washington, DC 20510 HC free; also available SOD HC \$2.00 as 552-707-09795-3

Hearings before the Subcommittee on Veterans Affairs, Housing and Urban Development, and Independent Agencies of the Senate Committee on Appropriations are presented on problems at the National Aeronautics and Space Administration (NASA). The hearing focused on the Hubble telescope, the space shuttle, and the space station and effects that problems with these projects have on the Federal budget. The management structure of NASA was discussed and the need for adequate support not only for space operations but also for research. Various broad issues were discussed as they pertain to the Subcommittee's stated goal of an affordable, achievable space program. Senator Garn noted that the identification and open discussion of problems with space projects when they are in the design stage is a necessary step for a successful mission. He stressed that the identification and discussion of problems that need to be corrected before liftoff is not pointing a finger at NASA's failures, as media personnel seem to perceive it, but is a normal and essential procedure which should be understood as such by the American taxpayers. J.P.S.

N91-20390*# Contel Federal Systems, Inc., Chantilly, VA. Government Networks Group.

DIRECT BROADCAST SATELLITE-RADIO MARKET, LEGAL, REGULATORY, AND BUSINESS CONSIDERATIONS Summary Report

DES R. SOOD Mar. 1991 115 p

(Contract NAS3-25083)

(NASA-CR-187093; NAS 1.26:187093) Avail: NTIS HC/MF A06 CSCL 17/2

A Direct Broadcast Satellite-Radio (DBS-R) System offers the prospect of delivering high quality audio broadcasts to large audiences at costs lower than or comparable to those incurred using the current means of broadcasting. The maturation of mobile communications technologies, and advances in microelectronics and digital signal processing now make it possible to bring this technology to the marketplace. Heightened consumer interest in improved audio quality coupled with the technological and economic feasibility of meeting this demand via DBS-R make it opportune to start planning for implementation of DBS-R Systems. NASA-Lewis and the Voice of America as part of their on-going efforts to improve the quality of international audio broadcasts, have undertaken a number of tasks to more clearly define the technical, marketing, organizational, legal, and regulatory issues underlying implementation of DBS-R Systems. The results and an assessment is presented of the business considerations underlying the construction, launch, and operation of DBS-R Systems.

Author

07 ECONOMICS, COSTS AND MARKETS

N91-21001# Logistics Management Inst., Bethesda, MD.
THE COST OF INFORMATION SYSTEMS MODERNIZATION: A COMPARISON OF OPTIONS FOR LIFE-CYCLE PROJECT MANAGEMENT SYSTEMS

ROBERT A. HUTCHINSON and ROBERT L. CROSSLIN Aug. 1990 73 p
(Contract MDA903-90-C-0006)
(AD-A230675; LMI-CE002R1) Avail: NTIS HC/MF A04 CSCL 05/1

The U.S. Army Corps of Engineers (USACE) has undertaken a systems modernization program that will govern its information management for the next decade. One of the major systems being developed under this plan is the Life-Cycle Project Management (LCPM) system. It was found that the current LCPM prototypes not only differ significantly in design and configuration but also in the functions they perform and their flexibility for further modification and enhancement. The costs associated with the options for Corps-wide implementation of LCPM at multiple sites vary widely (ranging from \$12 million for a centralized system to \$49 million for a totally decentralized system). Under current plans, a relatively expensive decentralized system will likely be implemented. Implementation options are identified that can meet LCPM needs at significantly lower cost. It is also recommended that USACE minimize the number of prototypes to be continued, recommend selection of an LCPM system that is built around existing commercial project management software, and centralized systems management and maintenance. GRA

N91-22142*# Massachusetts Inst. of Tech., Cambridge.
PROPOSAL FOR A REMOTELY MANNED SPACE STATION
MARVIN MINSKY In NASA. Lewis Research Center, Vision-21: Space Travel for the Next Millennium p 58-67 Apr. 1990
Avail: NTIS HC/MF A25 CSCL 22/2

The United States is in trouble in space. The costs of the proposed Space Station Freedom have grown beyond reach, and the present design is obsolete. The trouble has come from imagining that there are only two alternatives: manned vs. unmanned. Both choices have led us into designs that do not appear to be practical. On one side, the United States simply does not possess the robotic technology needed to operate or assemble a sophisticated unmanned space station. On the other side, the manned designs that are now under way seem far too costly and dangerous, with all of its thousands of extravehicular activity (EVA) hours. More would be accomplished at far less cost by proceeding in a different way. The design of a space station made of modular, Erector Set-like parts is proposed which is to be assembled using earth-based remotely-controlled binary-tree telerobots. Earth-based workers could be trained to build the station in space using simulators. A small preassembled spacecraft would be launched with a few telerobots, and then, telerobots could be ferried into orbit along with stocks of additional parts. Trained terrestrial workers would remotely assemble a larger station, and materials for additional power and life support systems could be launched. Finally, human scientists and explorers could be sent to the space station. Other aspects of such a space station program are discussed. Author

N91-22182*# Advisory Committee on the Future of the US Space Program, Washington, DC.
REPORT OF THE ADVISORY COMMITTEE ON THE FUTURE OF THE US SPACE PROGRAM
Dec. 1990 63 p Prepared for NASA, Washington Original contains color illustrations
(NASA-TM-104952; NAS 1.15:104952) Avail: NTIS HC/MF A04; 13 functional color pages CSCL 22/1

The United States' civil space program was rather hurriedly formulated some three decades ago on the heels of the successful launch of the Soviet Sputnik. A dozen humans have been placed on the Moon and safely returned to Earth, seven of the other eight planets have been viewed at close range, including the soft landing of two robot spacecraft on Mars, and a variety of significant astronomical and other scientific observations have been accomplished. Closer to Earth, a network of communications

satellites has been established, weather and ocean conditions are now monitored and reported as they occur, and the Earth's surface is observed from space to study natural resources and detect sources of pollution. Problems and perspectives of the program are given as seen by the committee. The committee finds that there are nine concerns about the space program which are deserving of attention. The responsibilities of the agency are given. The space agenda becomes one of what can and should the U.S. afford for its space program. Also given is a concept of what the committee believes is a balanced space program. The programs international role is defined and some final observations and recommendations are made. Author

N91-22355# RAND Corp., Santa Monica, CA.
THE FUTURE OF INTELSAT IN A COMPETITIVE ENVIRONMENT

LELAND L. JOHNSON Dec. 1988 60 p Sponsored by State Dept., Washington, DC
(AD-A231540; RAND/N-2848-DOS/RC) Avail: NTIS HC/MF A04 CSCL 22/2

INTELSAT has been an important instrument of U.S. foreign policy because it has spread the benefits of advanced telecommunications technology to nations - especially the developing nations - throughout the world. Concerns have arisen about INTERSAT's ability to continue its role as global provider of service in the face of growing competition. In response to these concerns, this study examines the financial situation that INTELSAT may face as a consequence of competition with fiber optic cable and other satellite systems. This is an important area for investigation because it may suggest pricing strategies and other responses by INTELSAT that would strengthen its ability to compete in a rapidly changing market environment. Author

N91-22927# Small Business Administration, Washington, DC.
STATE OF SMALL BUSINESS: A REPORT TO THE PRESIDENT, TRANSMITTED TO THE CONGRESS JANUARY 1990, TOGETHER WITH THE ANNUAL REPORT ON SMALL BUSINESS AND COMPETITION OF THE US SMALL BUSINESS ADMINISTRATION

Oct. 1990 300 p
(PB91-130849) Avail: NTIS HC/MF A13; also available SOD HC \$8.50 as 045-000-00260-8 CSCL 05/1

The current economic climate for small businesses, including job creation, business formation, earnings, failure and bankruptcy rates, and the outlook for new and small businesses is presented. GRA

N91-23076# Institute for Defense Analyses, Alexandria, VA.
THE COSTS AND BENEFITS OF AIRCRAFT AVAILABILITY Final Report, Jan. - Sep. 1990

MATTHEW S. GOLDBERG and KAREN W. TYSON Mar. 1991 45 p
(AD-A232660; AD-E501359; IDA-P-2462; IDA/HQ-90-35834) Avail: NTIS HC/MF A03 CSCL 01/2

This paper contains estimates of the effects of research and development costs (through initial operational capability) and unit procurement costs on the mission-capable (MC) rates of eleven tactical aircraft models. These estimates are transformed into estimates of the marginal cost of increasing MC rates through, respectively, increased development or increased procurement expenditures. The benefits of higher MC rates are also computed. One benefit is that, with more reliable aircraft, the procurement quantity may be reduced. A second benefit is that more reliable aircraft have lower operations and maintenance (O and M) costs in the field. The magnitudes of these effects are also estimated. Finally, the costs and benefits are combined to compute optimal levels of investment in reliability, both for hypothetical aircraft models and for the eleven aircraft models used in the statistical analysis. GRA

N91-23984# Department of Energy, Washington, DC. Office of Information Resources Management Policy, Plans, and Oversight.
INFORMATION RESOURCES MANAGEMENT LONG-RANGE PLAN

Dec. 1990 269 p
 (DE91-009745; DOE/AD-0005) Avail: NTIS HC/MF A12

The Information Resources Management (IRM) activities which support the diverse programmatic missions in the Department of Energy are complex. IRM requirements are continually changing to reflect changes in technology, policy, and program mission. Long-range planning for IRM has been developed to assure that adequate support is available for cost-effective accomplishment of mission objectives. IRM is vital to the successful accomplishment of the programmatic missions in the Department. This is evidenced by the fact that the estimated information technology resources (ITR) cost for FY 1991, approximately \$1.58 billion, is about 9 percent of the total Departmental FY 1991 budget request, while the total estimated ITR cost for the entire Federal Government is less than 1.7 percent of the total Federal budget request for the same time period. Recognizing the ever-increasing importance of IRM to the Department, activities in this area were reorganized this year. This reorganization centralized IRM within DOE and created a clear division of responsibility between policy and operations. Management of the information technology resources within IRM (e.g., information systems, computing resources, and telecommunications) were consolidated with printing and publishing activities, records management, IRM standards, and telecommunications and unclassified computer security. The Office of Scientific and Technical Information continues to have the responsibility for information management support and direction for DOE's scientific and technical information. This Plan reflects this transition and, therefore, incorporates information on other areas of IRM, where information is available. The management plan and status of Information Systems, Computing Resources and Telecommunication Systems is provided with charts and graphs. DOE

N91-24189# Federal Aviation Administration, Washington, DC.
AVIATION SYSTEM CAPITAL INVESTMENT PLAN Annual Report

Dec. 1990 355 p
 (PB91-150268) Avail: NTIS HC/MF A16 CSCL 17/7

The plan describes the policies and strategies that the FAA will pursue in addressing key concerns of the National Airspace System (NAS). The plan addresses safety, efficiency, traffic demands, aging equipment and facilities, and airspace use. The Capital Investment Plan (CIP) was developed to prepare the NAS for new developments. The plan makes the approach to air traffic modernization more precise, flexible, understandable, and dynamic. It distinguishes among near-term (1991-1995), mid-term (1996-2000), and far-term (2001-2005) planning. GRA

N91-25911# Profile Information, Sunbury-on-Thames (England).
THE ECONOMIC ASPECTS OF DEVELOPING AND MARKETING FULL TEXT DATABASES

MARK HEPWORTH In AGARD, Bridging the Communication Gap 3 p Feb. 1991
 Copyright Avail: NTIS HC/MF A06; Non-NATO Nationals requests available only from AGARD/Scientific Publications Executive

A brief overview is given of PROFILE Information, the process involved in getting and delivering a full text source of information online and the primarily economic issues involved. The process is broken down into collecting the data, designing and developing the database, delivering and selling the database. Author

N91-28272*# Thiokol Corp., Brigham City, UT. Space Operations.

POSSIBLE FUNDING STRATEGIES

T. F. DAVIDSON In NASA, Washington, Space Transportation Propulsion Technology Symposium. Volume 3: Panel Session Summaries and Presentations p 1359-1362 May 1991
 Avail: NTIS HC/MF A99 CSCL 05/3

Funding strategies are examined for the AIA rocket propulsion

strategic plan. Either the government, industry, or universities can fund the project alone, or it was concluded, it works best if is a combination of these sources. E.R.

N91-30058# Sandia National Labs., Albuquerque, NM.
TECHNOLOGY TRANSFER: A NEW PROGRAM BETWEEN SANDIA NATIONAL LABORATORIES AND THE UNIVERSITY OF NEW MEXICO

M. S. ALLEN 1991 2 p Presented at the 32nd Institute of Nuclear Material Management (INMM) Annual Meeting, New Orleans, 28-31 Jul. 1991
 (Contract DE-AC04-76DP-00789)
 (DE91-015439; SAND-91-1570C; CONF-910774-5) Avail: NTIS HC/MF A01

Sandia National Laboratories and the University of New Mexico's Anderson School of Management are developing a program which enables M.B.A. students to assist in commercializing Sandia developed technologies. Thus far, students have prepared detailed business plans (which include market analyses, design and development sections, and pro forma financials) for a wide range of technologies. Potential applications include waste management, cancer treatment, oil and gas transportation, coating of plastics, manufacturing and assembly, and parts inspections. By having graduate students conduct the research necessary to identify positive net-present-value projects, Sandia is able to interest private sector firms in its technologies. DOE

N91-30981# Government-Univ.-Industry Research Roundtable, Washington, DC.

RESEARCH FACILITY FINANCING: NEAR-TERM OPTIONS

Feb. 1991 21 p
 (Contract DE-FG05-89ER-75498)
 (DE91-013940; DOE/ER-75498/8) Avail: NTIS HC/MF A03

To address the financing of research facilities at universities, colleges, and independent nonprofit research institutions, this paper outlines options for policy changes on which agreement and initial action may be possible in the near future. As used in this discussion, the term research facilities refers to the buildings, building systems (such as power and ventilation), and fixed equipment (for example, benches and hoods) that constitute the physical plant for research. The Research Roundtable is concerned with the vitality of the nation's science and engineering research enterprise. It was established to deepen the understanding of issues that divide the partners in the research enterprise and to provide a setting for seeking common ground. By setting forth the overview of options contained herein, the Roundtable aims to facilitate the development, by the stake holders in the research enterprise, of specific proposals for new research facility financing policies. To the extent that consensus on appropriate changes emerges from dialogue furthered by this paper, a basis for action will have been laid. DOE

N91-31018# Air Force Inst. of Tech., Wright-Patterson AFB, OH.

AN INVESTIGATION OF THE STABILITY OF THE COST PERFORMANCE INDEX M.S. Thesis

KIRK I. PAYNE Sep. 1990 86 p
 (AD-A229498; AFIT/GCA/LSY/90S-6) Avail: NTIS HC/MF A05 CSCL 05/3

This study examines the stability of the Cost Performance Index (CPI). The CPI is an indicator of the cost performance efficiency achieved on a contract and is used to analyze cost performance on defense contracts. It has long been asserted that the index does not change by more than 10 percent after a contract is 50 percent complete, but an exhaustive literature search did not locate any empirical work that supports this assertion. Knowing that the CPI is stable is important because it indicates that a contractor has a healthy management system, it increases the reliability placed in the contractor's planning process, it gives confidence in our Estimate at Completion computations, and if a contractor is overrunning his budget, it gives confidence when declaring the contractor in trouble. After defining CPI stability two methods to test for stability were developed. The two methods

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chosen were first, to measure the range of the CPIs that occurred at greater than 50 percent complete and second, to calculate a percentage interval and verify that the CPI is stable after a contract is 50 percent complete. GRA

N91-32387# Royal Aerospace Establishment, Farnborough (England).

COST EFFECTIVE ELECTRONIC COMPONENTS FOR SHORT LIFE SPACE MISSIONS

J. J. WALL, R. HYMERS, and V. B. BERRY (Spur Electron Ltd., Havant, England) IN: ESA, ESA Electronic Components Conference p 595-600 Mar. 1991
Copyright Avail: NTIS HC/MF A25; EPD, ESTEC, Noordwijk, Netherlands, HC 90 Dutch guilders

A study performed to assess the possibility of reducing short life spacecraft costs by significantly reducing the financial impact of the procurement of Electrical, Electronic and Electromechanical (EEE) components, is described. Strategies for cost reduction which do not compromise the probability of mission success are sought. It is concluded that an overall component cost saving in the area of 90 percent is possible through the procurement of parts screened in accordance with a minimum quality method which is previously defined. An analysis of screening data from final production tests, burn in electrical measurements and lot acceptance tests is suggested as the basis of a procurement cost reduction exercise within space programs. ESA

08

LOGISTICS AND OPERATIONS MANAGEMENT

Includes Inventory Management and Spare Parts, Materials Management and Handling, Resources Management, Resource Allocation, Procurement Management, Leasing, Contracting and Subcontracting, Maintenance and Repair, Transportation, Air Traffic Control, Fuel Conservation, Operations, Operational Programs.

A91-10021*# National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, FL.

LAUNCH SITE INTEGRATION FOR MIXED FLEET OPERATIONS

L. P. SCOTT (NASA, Kennedy Space Center; Lockheed Space Operations Co., Cocoa Beach, FL) AIAA, Space Programs and Technologies Conference, Huntsville, AL, Sept. 25-27, 1990. 9 p. (AIAA PAPER 90-3559) Copyright

Launch site impacts and integration planning issues are presented to support launch operations for a mixed vehicle fleet (manned and cargo). Proposed ground systems and launch site configurations are described. Prelaunch processing scenarios and schedules are developed for candidate launch vehicles. Earth-to-orbit (ETO) vehicle architectures are presented to meet future launch requirements, including the Space Exploration Initiative (SEI). Flight vehicle design recommendations to enhance launch processing are discussed. The significance of operational designs for future launch vehicles is shown to be a critical factor in planning for mixed fleet launch site operations. Author

A91-10902# INTEGRATED LOGISTICS SUPPORT - SUGGESTED APPROACH FOR COLUMBUS

G. F. DE LUCA, R. GRAZI, and S. MASULLO (Compagnia Italiana Servizi Tecnici S.p.A., Rome, Italy) IN: Space Logistics Symposium, 3rd, Colorado Springs, CO, Apr. 30-May 2, 1990, Proceedings. Huntsville, AL, Society of Logistics Engineers, 1990, 10 p. refs

An overview is provided of how the Columbus logistics support is to be designed, focusing particularly on the engineering support centers, where major Columbus logistics tasks are to be undertaken. The functions necessary to ensure an effective logistics ground support, in compliance with the available set of requirements, are discussed. The necessary facilities and tools

that take into account the previously foreseen and/or existing infrastructures are described. Interfaces with the other main functions in the Columbus ground segment are identified with the goal of achieving a logistics system properly integrated in the overall Columbus ground infrastructures. It is shown that the functions of the engineering support center are strictly correlated and it is not easy to define the boundaries comprising one function with the exclusion of the others. R.E.P.

A91-17242

MATERIAL SUPPORT ISSUES FOR AGING ROTARY WING AIRCRAFT

STEPHAN L. RITCHEY (U.S. Navy, Product Support Directorate, Cherry Point, NC) IN: AHS, Annual Forum, 46th, Washington, DC, May 21-23, 1990, Proceedings. Volume 1. Alexandria, VA, American Helicopter Society, 1990, p. 591-595. Copyright

This paper will deal with some of the main problems concerning material support of older models of rotary wing aircraft and some of the decisions which need to be made in order to keep the support adequate to maintain readiness goals which have been established. The paper will examine material support issues such as the management of consumables, management of repairables, proper implementation of engineering changes, and replacement of components which have reached their service lives. These issues will be examined from two different viewpoints: first, whether they are generic issues with specific issues, and second, whether the trend in managing these issues is becoming more positive or degenerating. The paper reflects the views of the senior logistics manager for 341 fielded H-46 aircraft and emphasizes the day-to-day realities of that task rather than the theoretical aspects involved in logistics planning tasks. Author

A91-19399#

IMPROVING FACILITY EFFECTIVENESS TO REDUCE TESTING COST

RAMESH C. GULATI (Sverdrup Technology, Inc.; USAF, Arnold Engineering Development Center, Arnold AFB, TN) AIAA, Aerospace Sciences Meeting, 29th, Reno, NV, Jan. 7-10, 1991. 10 p. refs
(AIAA PAPER 91-0656) Copyright

The operational objectives of an engine test facility, including the improvement of equipment and facility availability, the optimization of tasks and activities, and the reduction of energy costs are identified. Ways of improving the equipment and facility availability through failure prevention and equipment history analysis are discussed, and focus is placed on preventive, predictive, and reliability-centered maintenance. Statistical process control principles applied to maintenance in order to control cost or failures are outlined. Maintenance-optimization models, culture-dependent technique and tools, and works standards including planning and scheduling are considered. A measurement system evaluating the effectiveness of the proposed tools and methods is specified. V.T.

A91-27723

NORMAL ACCIDENTS AND LOGISTICS IN SPACE OPERATIONS

ALEXANDER K. BOCAST (DOD, Office of the Assistant Secretary of Defense for Production and Logistics, Washington, DC) IN: Engineering, construction, and operations in space II; Proceedings of Space 90, the Second International Conference, Albuquerque, NM, Apr. 22-26, 1990, Vol. 2. New York, American Society of Civil Engineers, 1990, p. 1482-1491. Copyright

Unpredictable systemic accidents, called normal accidents, will occur in highly complex large-scale space systems. To mitigate the catastrophic consequences of normal accidents, containment engineering will need to rely upon adequate logistics infrastructures provided by transform logistics channels to minimize consequential risk to target systems. The resource requirements of such an in situ logistics infrastructure to support the primary logistics channels

of target systems may be orders of magnitude larger than current models estimate. Author

A91-39772

ENERGY MANAGEMENT ONBOARD THE SPACE STATION - A RULE-BASED APPROACH

MOUNIR BOUZGUENDA and SAIFUR RAHMAN (Virginia Polytechnic Institute and State University, Blacksburg) IEEE Transactions on Aerospace and Electronic Systems (ISSN 0018-9251), vol. 27, March 1991, p. 302-310. refs Copyright

The logic and the schedule for a rule-based optimization technique useful for energy management onboard the space station are presented. A diverse array of experiments is scheduled within the constraints of limited solar energy and battery storage availability, taking into account the uneven energy supply between the sunshine and eclipse periods and the occasional need to serve a peak load and the full battery charging load simultaneously. In addition, the noninterruptible and nonrestartable nature of many experiments has to be accounted for in the schedule. These factors have been accounted for by using various time intervals and priority weighting factors. Supply/demand windows of various durations are tested for the typical load profile. This shows under what circumstances fewer scheduling tasks are needed and how a closer match between the supply and demand can be obtained. The optimal supply/demand is expressed in terms of the excess and shortage of electricity, the peak load, and the time displacement of the individual payloads. This technique is implemented using PROLOG and FORTRAN. I.E.

A91-45399#

INTEGRATED LOGISTIC SUPPORT IN THE NH90 PROJECT

H. VAN DEVENTER (Royal Netherlands Navy, The Hague) and PROVO KLUIT (Fokker Aircraft, Amsterdam, Netherlands) European Rotorcraft Forum, 15th, Amsterdam, Netherlands, Sept. 12-15, 1989, Paper. 19 p.

The purpose of the study is to justify the principle of integrated logistic support (ILS) and show its implementation in the NATO Helicopter for the 1990s (NH90) program. It is pointed out that ILS requires close cooperation of design, operational user, and maintenance areas; this 'triangle' consultation should be established prior to the definition of design requirements and continue through the total life cycle of the system. Emphasis is placed on system reliability, availability, maintainability, and testability at the start of the conceptual design phase. It is noted that in-service costs form a major part of the system life cycle costs and therefore, is an attractive area of cost reduction. Attention is given to logistic reviews to be conducted by national and international working groups as an effective instrument for providing a better understanding between designers and logisticians. V.T.

A91-52957

MAINTENANCE OF GROUND SUPPORT EQUIPMENT

SAE Aerospace Information Report, AIR 4286, Nov. 29, 1990. 8 p.

(SAE AIR 4286) Copyright

A methodology is outlined which encompasses the acquisition, maintenance, and disposal of ground-support equipment and is intended to promote safe, serviceable equipment. Maintenance during the acquisition process includes setting specifications, standardizing equipment, evaluating available equipment, and training and provisioning during purchasing phases. The maintenance period is found to require the establishment of maintenance practices such as inspection, quality audits, and defined equipment categories. Other important considerations for maintenance are unscheduled maintenance, human resources, facilities, equipment and special tools, cost controls, and management-information systems. Important factors related to equipment disposal are set forth with respect to the replacement decision and equipment rebuild. C.C.S.

A91-54140

COORDINATED PARTS PROCUREMENT FOR ISO - A CONTRIBUTION TO COST-EFFECTIVENESS

M. VON HOEGEN, J. MINNEE (ESA, Directorate for Scientific Programmes, Noordwijk, Netherlands), and F. J. ZIEGLER (MBB GmbH, Munich, Federal Republic of Germany) ESA Bulletin (ISSN 0376-4265), no. 67, Aug. 1991, p. 29-36.

Copyright

The parts-procurement process for the Infrared Space Observatory (ISO) is described and evaluated in order to identify strategies for efficiently obtaining reliable electronic components for similar programs. The procurement approach included central coordination by a 'prime contractor,' a coordinating advisory board, direct ordering from a procurement agent, for all users, and a cost-assessment mechanism. Important features of the program are identified including procurement organization, phase scheduling, component engineering issues, and cost considerations. The approach emphasizes drastic reductions in required part types and a significant standardization process. The procedural efforts are helpful for the ISO program and can be applied to other programs to reduce procurement costs, increase system reliability, and reduce the risks of multiple part types and lot failures. C.C.S.

A91-55818

POTENTIAL EQUATORIAL LAUNCH SITES

ANDREW H. CUTLER (Arizona, University, Tucson), STEPHEN M. LORD (SML Associates, Encinitas, CA), and DAVID ANDERMAN (National Space Society, San Diego, CA) IN: Space utilization and applications in the Pacific; Proceedings of the 3rd Pacific Basin International Symposium on Advances in Space Science Technology and its Applications, Los Angeles, CA, Nov. 6-8, 1989. San Diego, CA, Univelt, Inc., 1990, p. 175-189. (AAS PAPER 89-620) Copyright

Attention is given to a new commercial launch site capable of serving the market for launch to geostationary orbit. The study represents an attempt to understand how a small, simple spaceport, similar in nature to a small seaport which might be built, owned, and operated by a construction or oil company, might be justified and constructed. Results of the study indicate that the concept of launching existing vehicles from simple equatorial sites has both technical and economic merits. An attempt is made to develop a knowledge base for vehicle performance calculations, site data, market projections, and contacts in the international industry. O.G.

A91-55819

PACIFIC INTERNATIONAL COMMERCIAL SPACEPORT PROSPECTS

JAY MILLER (Space Business Consultants, Inc., Menlo Park, CA) IN: Space utilization and applications in the Pacific; Proceedings of the 3rd Pacific Basin International Symposium on Advances in Space Science Technology and its Applications, Los Angeles, CA, Nov. 6-8, 1989. San Diego, CA, Univelt, Inc., 1990, p. 203-214. (AAS PAPER 89-622) Copyright

Prospects for establishing an international spaceport in the near-equatorial Pacific are discussed. It is hypothesized that the future spaceport will likely have little or no facilities for missile-derived launch systems, but would rather be centered around new space transportation system technologies including electromagnetic space launch and single-stage-to-orbit vertical-take off-vertical-landing vehicles. Particular attention is given to trends and activities leading to spaceports, economic opportunities represented by Pacific spaceports, small low cost commercial launch vehicles, electromagnetic space launch, reusable semiballistic passenger vehicles, and innovations in technologies and markets. O.G.

N91-10091# Messerschmitt-Boelkow-Blohm/Entwicklungspring Nord, Bremen (Germany, F.R.). Dienstleistungsbereich.

COLUMBUS LOGISTICS SUPPORT. A CONCEPTIONAL DEFINITION OF THE OPERATIONAL PHASE

H. J. C. KOOPMANN and MIKE C. ATTWOOD 1990 9 p

(MBB-UO-0093-90-PUB; ETN-90-97837; OTN-027616) Avail: NTIS HC/MF A02

In order to logistically support the systems included in the Columbus program, logistic support concepts and facilities are developed. The logistics support functions for the Columbus operational phase includes the identification of major facility requirements and recommendations for support of the implementation planning. These tasks have to be complemented by the definition and implementation of a logistics support system and its related facilities and proceedings. Emphasis is given to the logistics functions which drive facility requirements, on general considerations for a long term support program, e.g., centralization aspects, and on the intended implementation approach. ESA

N91-11591*# National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, FL.

TWENTY-SECOND ANNUAL NASA SUPPLY AND EQUIPMENT MANAGEMENT CONFERENCE

1989 384 p Conference held in Cocoa Beach, FL, 5-7 Dec. 1989

(NASA-CP-10042; NAS 1.55:10042) Avail: NTIS HC/MF A17 CSDL 05A

The status of actions from the 1988 conference is reviewed. Environmental safety issues, definitions, and regulations; contract transition, payload logistics transition, and safety and support equipment; supply products and services, bar code technology, and inventory accuracy; equipment management workshop topics; and contract property workshop topics are outlined. Author

N91-11787 Dayton Univ., OH.

OPTIMAL SELECTION OF ORBITAL REPLACEMENT UNIT SPARES: A SPACE STATION SYSTEM AVAILABILITY MODEL Ph.D. Thesis

DOUGLAS GERARD SCHWAAB 1990 256 p
Avail: Univ. Microfilms Order No. DA9027422

A methodology is investigated for the logistics support analysis of the selection of orbital replacement unit (ORU) on-orbit spares for a space station. A mathematical model is developed to select the ORU spares combination that maximizes system availability and is constrained for both the weight and volume allocated from the pressurized logistics module (PLM) payload capacity for the system's ORU spares. The optimal solution of ORU spares will replenish the space station's on-orbit inventory. The model integrates the system design and logistics parameters to provide a decision support tool for both engineering analysis and logistics resupply planning. The impact of resupply mission scenario, center of gravity, and mechanical vibration restrictions on loading cargo in the PLM are also explored. The analyses consider the deviations from loading the PLM racks with a uniform mass distribution and the resulting loss of usable PLM payload capacity. The system availability model is formulated as a nonlinear integer programming problem and is transformed into a 0 to 1 linear integer programming problem. Conceptual data for the space station's environmental control and life support system (ECLSS) is used to exercise the model and conduct a sensitivity analysis on the model's logistics resupply and system design parameters. A preliminary investigation is conducted on the issue of selecting ORU on-orbit spares when there are multiple systems with different criticality levels. The system availability model solutions are used to approximate the availability response to payload allocations in a prototype, multiple-objective decision model to optimize the distribution of the PLM payload capacity between the multiple systems. To illustrate the methodology, the prototype model is exercised with the subsystems that compose the ECLSS. Dissert. Abstr.

N91-16830# Logistics Management Inst., Bethesda, MD.
MANAGEMENT INFORMATION: A KEY TO BETTER

ACQUISITION AT NIH Final Report

HARRY H. MOORE, CYNTHIA W. SHOCKLEY, and ROBERT A. SPARGO Apr. 1990 106 p
(Contract MDA903-85-C-0139)
(AD-A226867; LMI-NI801R1) Avail: NTIS HC/MF A06 CSDL 05/1

The acquisition process at the National Institutes of Health (NIH) provides a wide variety of supplies and services to the on-campus research and administrative staff. Management of the process must balance responsiveness with frugal procedures that meet all statutory and regulatory requirements. Achieving the appropriate balance is a challenge, particularly since NIH has no objective, quantifiable, acquisition performance standards. It is recommended that it develop such standards and use them to measure how well the acquisition process is meeting its goals. In addition, NIH is not managing its information resources to best support its organizational goals and objectives. We recommend that it do so in a systematic process that we term a management information system (MIS). The MIS should be defined by a MIS team - a partnership of acquisition information specialists and functional managers who work together to define the data and system needed to make good decisions. We believe that NIH can improve its automated resources to better support the MIS.

GRA

N91-16989# Air Force Inst. of Tech., Wright-Patterson AFB, OH. School of Systems and Logistics.

PRODUCTIVITY MEASUREMENT IN AIRCRAFT MAINTENANCE ORGANIZATIONS M.S. Thesis

BILLY J. GILLILLAND Sep. 1990 224 p
(AD-A229239; AFIT/GLM/LSM/90S-20) Avail: NTIS HC/MF A10 CSDL 15/5

This research was undertaken to explore productivity measurement in aircraft maintenance units and to examine the relationships of the measures used to evaluate a unit's productivity. Review of current literature and regulatory guidance concerning productivity measurement provided the basis for the development of an interview questionnaire. A questionnaire was administered to Deputy Commanders for Maintenance (DCMs) and chiefs of analysis at ten Military Airlift Command (MAC) wings. Additionally, managers in the maintenance management, cost and manpower divisions at Headquarters MAC were interviewed. From these interviews, information concerning current productivity measurement methodology was gathered and thirteen measures were identified for analysis. Of the thirteen measures evaluated, eight produced the strongest explainable model reflecting maintenance productivity. Manhours per flying hour was the predominant output when viewed as a result of the influence of mission capable rates and maintenance scheduling effectiveness. Cannibalization rates, delayed discrepancies (both awaiting parts and awaiting maintenance) and the average number of aircraft possessed were the inputs which appeared to contribute most significantly to mission capable rates and maintenance scheduling effectiveness. GRA

N91-19075# MiTech, Inc., Washington, DC.

THE 1990-1991 AVIATION SYSTEM CAPACITY PLAN Report, Jul. 1989 - Jun. 1990

Sep. 1990 312 p
(Contract DTFA01-89-Y-01047)
(AD-A229863) Avail: NTIS HC/MF A14 CSDL 01/3

This is a comprehensive review of the Federal Aviation Administration's program to improve the capacity of the National Air Transportation System. The Plan identifies the causes and extent of capacity and delay problems currently associated with air travel in the U.S., and outlines various planned and ongoing FAA projects that will reduce the severity of the problem in the future. The major areas of discussion are: (1) Airport Development; (2) Airport and Airspace Capacity Improvement; (3) Technological Improvements; and (4) Marketplace Solutions. GRA

N91-22137# Air Force Inst. of Tech., Wright-Patterson AFB, OH.

STATUS OF PAVER IMPLEMENTATION WITHIN THE US AIR FORCE M.S. Thesis

C. L. EADDY Dec. 1990 164 p
(AD-A231158; AFIT/CI/CIA-90-126) Avail: NTIS HC/MF A08 CSDL 13/2

Regardless of how well conceived a pavement management

system (PMS) is, unless well implemented and accepted by the end user its benefits cannot be realized. This paper seeks to estimate the present status of implementation within the U.S. Air Force of the pavement management system, PAVER. This work is based in part on an initial effort by Captain Timothy R. McLean who in 1984 wrote his graduate thesis on improving PAVER implementation. In his research he sought to determine the problems encountered in the field during the implementation of PAVER as well as recommendations from the field for improving or refining PAVER. He identified training, manpower, equipment, and top management support as key areas requiring attention to improve PAVER implementation. This work seeks to estimate and validate not only the present extent of these pre-identified problem areas, but also the current extent of PAVER's use and application. Example areas which the questionnaire addresses include an estimation of the following: the number of air bases which have partially or fully implemented PAVER; the accuracy of pavement distress and inventory data being used; the application of PAVER to project programming; the ranking of benefits from using PAVER; and preceptions of PAVER as an innovation which have been identified in various literature as factors influencing the diffusion of innovation. GRA

N91-22222*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.

THE EXPLORER PLATFORM PLANNING SYSTEM: AN APPLICATION OF A RESOURCE REASONING PLANNING SHELL

DAVID R. MCLEAN, BRENDA J. PAGE (Bendix Field Engineering Corp., Seabrook, MD.), and WILLIAM J. POTTER /in ESA, Ground Data Systems for Spacecraft Control p 195-200 Oct. 1990 (Contract NAS5-31000; NAS5-27772)

Copyright Avail: NTIS HC/MF A99 CSCL 09/6

The Explorer Platform Planning System (EPPS) designed to provide tools which allow mission planners to schedule the platform activities and resource utilization of each mission is described. In order to support scheduling for different missions, EPPS tools are designed so that the mission specific reconfiguration process can be done with minimum effort and disruption. The planning and scheduling tools which support EPPS are described. ESA

N91-22223*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

GROUND DATA SYSTEM RESOURCE ALLOCATION PLANNING TO SUPPORT MISSION MANAGEMENT

RALPH DURHAM, NORMAN B. REILLY, JOE B. SPRINGER, and THOMAS M. TAYLOR /in ESA, Ground Data Systems for Spacecraft Control p 201-206 Oct. 1990 Sponsored by NASA, Washington

Copyright Avail: NTIS HC/MF A99 CSCL 09/6

Mission planning and management optimization using unique planning methodologies is described. The ground data system resource allocation process provides mission planners and managers with both short and long range visibility of resource loading. Launch dates, mission designs, and spacecraft sequencing can be planned to optimize science return despite limited resources. Periods of resource contention are identified for managers of flying missions in time for them to plan and implement alternatives rather than be forced to react hastily to unforeseen conflicts. Conflict resolution is by consensus, and a simple route of appeal is provided. ESA

N91-23762# Army Construction Engineering Research Lab., Champaign, IL.

MAINTENANCE RESOURCE PREDICTION MODEL (MRPM) USER'S MANUAL Final Report

EDGAR S. NEELY, ROBERT D. NEATHAMMER, and JAMES R. STIRN Jan. 1991 280 p (AD-A232019; CERL-ADP-P-91/12) Avail: NTIS HC/MF A13 CSCL 12/7

The Maintenance Resource Prediction Model (MRPM) is a computer system designed to assist in planning and programming maintenance resources, based on the anticipated resource

requirements of actual installation facilities, for prediction periods of 1 to 10 years. This User's Manual provide improved maintenance resource data for use in facility planning, design, and maintenance activities. This manual explains this application of the MRPM computer system to installation facility data base information, to help Army planners in preparing DD Form 1391 documentation, designers in life cycle cost component selection, and maintainers in resource planning. This data base and computer system is presently used by U.S. Army Corps of Engineers (USACE) designers at district and installation levels, and by resource programmers at the USACE Headquarters, Army Major Command, and installation levels. These products may also prove useful to other Government agencies and to the private sector. GRA

N91-23769# Army Construction Engineering Research Lab., Champaign, IL.

LIFE CYCLE MANAGEMENT AUTOMATION PROGRAMMER'S MANUAL Final Report

DON KERMATH, YUNG PAN, JUI-TINE LEE, and GONZALO PEREZ Jan. 1991 107 p (AD-A232247; CERL-ADP-P-91/05) Avail: NTIS HC/MF A06 CSCL 12/5

Life Cycle Management Automation is a microcomputer system to manage the Army Reserve Inventory of Facilities through their entire life cycle, from acquisition to disposal. The system is made up of several computer programs, all of which access a common database. The programs included in the LCM are: UNIT, FACILITY, AMSA, BACKLOG, ProjDoc, MINOR, and REAL ESTATE. The programs UNIT, FACILITY, and AMSA collect the basic data used by BACKLOG ProjDoc, MINOR, and REAL ESTATE. BACKLOG generates the 5-year plan. ProjDoc produces Military Construction, Army Reserve (MCAR) project documentation in minutes. MINOR manages the Minor Construction Program. REAL ESTATE manages the Real Estate Program. LCM requires no special computer training. It runs on IBM-compatible computers with at least 420 K memory, PC DOS 3.1 or higher, 1 floppy disk drive, 8 to 15 megabytes of free hard disk space for the program, and a printer with a 12-character per inch capability. GRA

N91-30972# Army Construction Engineering Research Lab., Champaign, IL.

HQ-IFS MAINTENANCE RESOURCE PREDICTION MODEL (MRPM) USER'S MANUAL Final Report

BOON GOH, EDGAR S. NEELY, and ROBERT NEATHAMMER Oct. 1990 246 p (AD-A229297) Avail: NTIS HC/MF A11 CSCL 15/5

Maintenance Resource Prediction Models (MRPMs) are a set of models that run on various computer systems to assist Army managers in planning and programming maintenance resources, based on the anticipated resource requirements of actual installation facilities, for prediction periods of 1 to 10 years. There are three types of MRPM systems: (1) Headquarters-Integrated Facilities (HQ-IFS); (2) Major Command (MACOM); and (3) Installation Research systems. This user's manual covers the HQ-IFS MRPM system, and describes system operations at the Army, MACOM, and Reporting Installation levels. Separate sections explain the application of the HQ-IFS MRPM to each level, through step-by-step description and screen illustration of each program function. The HQ-IFS mainframe host computer can be accessed by a DOS-based, personal computer system through the use of terminal emulation software. Maintenance Resource Prediction Models (MRPMs) are a set of models that run on various computer systems to assist Army managers to plan and program maintenance resources, based on the anticipated resource requirements of actual installation facilities, for prediction periods of 1 to 10 years. GRA

N91-31494# Federal Aviation Administration, Atlantic City, NJ. **SOLID-STATE RADAR BEACON DECODER (SSRBD) MASTER TEST PLAN (MTP)**

LEONARD H. BAKER and THOMAS D. BRATTON Sep. 1991 37 p (DOT/FAA/CT-TN91/33) Avail: NTIS HC/MF A03

The Master Test plan (MTP) establishes the basic framework to guide and direct the Solid-State Radar Beacon Decoder (SSRBD) test program. The MTP explains the relationship between all test phases and also concerns the SSRBD system's readiness to be integrated into the National Airspace System (NAS). Sufficient detail is provided to define and direct the development of the next lower level of documentation. The MTP addresses the responsibilities of the SSRBD contractor and the Federal Aviation Administration (FAA). Author

N91-31495# Federal Aviation Administration, Atlantic City, NJ.
AERONAUTICAL MOBILE SATELLITE SERVICE (AMSS) TEST PLAN
 SEAN M. SANDLIN (Computerized Technologies, Inc., Columbus, OH.) May 1991 49 p
 (Contract NASA ORDER T-0704-F)
 (DOT/FAA/CT-TN91/20) Avail: NTIS HC/MF A03

A test program is described which will be conducted by the Federal Aviation Administration to support the validation of Standards and Recommended Practices being developed for the Aeronautical Mobile Satellite Service by the International Civil Aviation Organization. A description of the Communication Test Facility is also presented which will be used to perform the tests. A brief description is also included of each test to be performed along with setup and data to be recorded. Author

N91-31987# Manchester Univ. (England). School of Management.
A STUDY OF THE LOGISTICS FUNCTION WITHIN A MEDIUM SIZED, SALES ORIENTED CHEMICAL COMPANY M.S. Thesis
 S. OAKLEY Oct. 1990 255 p
 (ETN-91-99983) Copyright Avail: NTIS HC/MF A12

The extent to which logistics integration has been achieved in a medium sized, sales oriented chemical company which is committed to technical excellence and customer service as its principal competitive strategic tools is examined. Particular reference is made to the need to develop interdepartmental communications and to rationalize the way in which IT (Information Technology) is used within the firm. The relationships with outside third party service providers is examined and commented upon. The research finds that internal linkages within the company are not well developed, that an unusual line management organization leads to warehouse inefficiencies, that the computer system in use is hampered by an overdependence on manual interfacing and that a review of the transport/firm interface is necessary to release economies of scale and to prepare for the SEM. The lack of IT in one department is shown to be exacerbating an organizational anomaly, especially where the dispatch of samples is concerned. Suggestions for remedies are given and areas of related future research made. ESA

N91-31999# General Accounting Office, Washington, DC.
 National Security and International Affairs Div.
ACQUISITION REFORM: IMPLEMENTING DEFENSE MANAGEMENT REVIEW INITIATIVES. REPORT TO THE CHAIRMAN AND RANKING MINORITY MEMBER, SUBCOMMITTEE ON DEFENSE INDUSTRY AND TECHNOLOGY, SENATE COMMITTEE ON ARMED SERVICES
 Aug. 1991 14 p
 (AD-A239423; GAO/NSIAD-91-269) Avail: NTIS HC/MF A03
 CSCL 15/5

DOD has made several of the changes to its acquisition system that were recommended by the Packard Commission. DOD, for example, has streamlined the acquisition management structure, established the position of Under Secretary of Defense for Acquisition, and limited formal reporting requirements. The Packard Commission concluded that DOD's acquisition system had become an increasingly bureaucratic and overregulated process in which acquisition policy making and program management responsibility were fragmented and diluted. The Commission painted, in its words, a 'stark' picture of a highly competitive acquisition system in which program managers, buffeted by numerous internal and external pressures, become 'suplicants' for, rather than managers of, major

new defense systems. These competitive pressures resulted in a huckster psychology that leads program managers to optimistically interpret information about a system's cost, schedule, and performance. GRA

N91-32368# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (Germany, F.R.). Space Communications and Propulsion Systems Div.

A STATISTICAL EVALUATION OF EEE-PARTS PROCUREMENT DATA FROM TELECOMMUNICATION SATELLITES

E. PURR In ESA, ESA Electronic Components Conference p 491-498 Mar. 1991
 Copyright Avail: NTIS HC/MF A25; EPD, ESTEC, Noordwijk, Netherlands, HC 90 Dutch guilders

High reliability Electric, Electronic, and Electromechanical (EEE) parts procurement data from six telecommunication satellite projects are statistically evaluated. For comparison purposes, data from a scientific satellite project are included. Problems relating to procurement cost and timescale reduction and the continuing necessity to procure 50 percent (by cost) of all parts from U.S. manufacturers are identified. A number of actions are proposed to solve these problems. ESA

N91-32369# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.

AN OVERVIEW OF THE NASA ELECTRONIC COMPONENTS INFORMATION MANAGEMENT SYSTEM

G. KRAMER and S. WATERBURY In ESA, ESA Electronic Components Conference p 499-502 Mar. 1991
 Avail: NTIS HC/MF A25; EPD, ESTEC, Noordwijk, Netherlands, HC 90 Dutch guilders

The NASA Parts Project Office (NPPO) comprehensive data system to support all NASA Electric, Electronic, and Electromechanical (EEE) parts management and technical data requirements is described. A phase delivery approach is adopted, comprising four principal phases. Phases 1 and 2 support Space Station Freedom (SSF) and use a centralized architecture with all data and processing kept on a mainframe computer. Phases 3 and 4 support all NASA centers and projects and implement a distributed system architecture, in which data and processing are shared among networked database servers. The Phase 1 system, which became operational in February of 1990, implements a core set of functions. Phase 2, scheduled for release in 1991, adds functions to the Phase 1 system. Phase 3, to be prototyped beginning in 1991 and delivered in 1992, introduces a distributed system, separate from the Phase 1 and 2 system, with a refined semantic data model. Phase 4 extends the data model and functionality of the Phase 3 system to provide support for the NASA design community, including integration with Computer Aided Design (CAD) environments. Phase 4 is scheduled for prototyping in 1992 to 93 and delivery in 1994. ESA

N91-32370# Components Technology Inst., Inc., Huntsville, AL.
THE HISTORY OF SPACE QUALITY EEE PARTS IN THE UNITED STATES

LEON HAMITER In ESA, ESA Electronic Components Conference p 503-506 Mar. 1991
 Copyright Avail: NTIS HC/MF A25; EPD, ESTEC, Noordwijk, Netherlands, HC 90 Dutch guilders

Major and subtle characteristics which make space quality parts different than military, commercial or automotive parts are discussed. Very few Electrical, Electronic and Electromechanical (EEE) parts are specifically designed for space applications due to the low volume and sporadic purchasing/manufacturing requirements. The difficulty and apparent high cost of obtaining true space quality parts have caused many space programs to pursue short cuts such as upgrading lower quality parts through testing and taking risks on using lower quality parts as they are. Historical milestones in the development of space quality parts in the U.S., some cost examples when space quality parts were not used and some good practices for reliable space quality EEE parts are reviewed. ESA

N91-32371# Messerschmitt-Boelkow-Blohm G.m.b.H., Bremen (Germany, F.R.).

RATIONALES FOR THE SELECTION OF A PARTS PROCUREMENT SYSTEM (COORDINATED VERSUS CENTRALIZED) FROM A PRIME CONTRACTOR POINT OF VIEW

G. STAMERJOHANN *In* ESA, ESA Electronic Components Conference p 509-513 Mar. 1991 Prepared in cooperation with Erno Raumfahrttechnik G.m.b.H.

Copyright Avail: NTIS HC/MF A25; EPD, ESTEC, Noordwijk, Netherlands, HC 90 Dutch guilders

In spite of the significant variation in size and number of contractors involved in different space programs the major prime contractor goals and responsibilities remain similar. Electrical, Electronic and Electromechanical (EEE) parts procurement related problems experienced during the majority of past programs have led to program delays and excessive, underestimated program cost. In order to minimize such program impacts, experience gained and lessons learnt are used to trade off different EEE parts procurement approaches. Centralized procurement is compared to coordinated procurement. The results of this trade off approach are used to plan, structure and implement the centralized procurement approach selected for the Columbus program. ESA

N91-32372# Spur Electron Ltd., Havant (England).

EEC COMPONENT PROCUREMENT: A LOOK AHEAD

M. SNOWDON *In* ESA, ESA Electronic Components Conference p 515-517 Mar. 1991

Copyright Avail: NTIS HC/MF A25; EPD, ESTEC, Noordwijk, Netherlands, HC 90 Dutch guilders

It is demonstrated that a properly managed Electrical, Electronic and Electromechanical (EEE) component procurement program not only provides components of a quality and reliability standard which meet or exceed project requirements, but surpasses project aims in a cost and schedule effective manner. A number of key areas associated with an EEE parts procurement program are discussed. The ESA/SCC specification system, various types of procurement approaches and the role of the procurement agents are reviewed. A number of recommendations are made which, if implemented will further improve upon the successes achieved to date. ESA

N91-32373# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands). Components Div.

ESA'S COMPONENT PROGRAMME PLAN

U. ERNSBERGER *In* its ESA Electronic Components Conference p 519-522 Mar. 1991

Copyright Avail: NTIS HC/MF A25; EPD, ESTEC, Noordwijk, Netherlands, HC 90 Dutch guilders

A critical review of the actual methods, procedures and concepts applied to the procurement, assurance and control of components for space application is presented. The result of this review is reflected in the ESA components program plan which aims at enhancing the availability of advanced component technology for forthcoming space programs and providing a solid technology platform in Europe. The main elements of the plan including ESA component policy and long term objectives are described. Efforts in research, technology, standardization and related infrastructure are outlined. ESA

N91-32374*# National Aeronautics and Space Administration, Washington, DC.

NASA'S CHALLENGE FOR TOMORROW

DANIEL L. BARNEY *In* ESA, ESA Electronic Components Conference p 523-529 Mar. 1991

Copyright Avail: NTIS HC/MF A25; EPD, ESTEC, Noordwijk, Netherlands, HC 90 Dutch guilders CSCL 09/3

The early space probes provided our first detailed look at the planets, and demonstrated the critical role played by parts technology. The advanced orbital platform under development, the Space Station Freedom (which represents a pivotal step in the space program) contains about 5 million Electrical, Electronic and Electromechanical (EEE) parts. Thus, EEE parts continue to be

crucial to mission success. The NASA EEE parts program establishes and directs policy and integration throughout the Agency. The EEE program structure, issues and solutions are described. The challenge presented by advanced electronic devices is discussed. ESA

N91-32375# TRW Components International, Inc., Torrance, CA.

PARTS MANAGEMENT FOR THE 1990'S

S. JENNINGS and M. SCOTT *In* ESA, ESA Electronic Components Conference p 531-534 Mar. 1991

Avail: NTIS HC/MF A25; EPD, ESTEC, Noordwijk, Netherlands, HC 90 Dutch guilders

Space Programs of the 1990's are predicted to present demands upon parts management more difficult than in time past. There will be increased management pressure to lower the cost of space systems. Cost effective solutions must be found. Changes that influence the 1990's environment are discussed. Some examples that can be effective in dealing with these issues are presented. ESA

N91-32376# IGG Component Technology Ltd., Portsmouth (England).

UPSCREENING OF COMPONENTS FOR SPACE APPLICATIONS

R. FIDLER *In* ESA, ESA Electronic Components Conference p 537-544 Mar. 1991

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The term upscreening is used to describe additional testing performed on military or similar components to obtain a level of confidence and to justify acceptance for space usage. Upscreening is carried out when a space program cannot obtain components through usual procurement methods due for example to component lot failure, or to the reluctance of a single source manufacturer to accept a high reliability order. Most space programs are obliged to use a small percentage of upscreened components. For a recent satellite project, upscreening was performed on some 130 different part types. The part types upscreened, the testing performed and a summary of the results obtained are presented. Some of the results which are different than those expected are examined in detail. Conclusions are drawn which prove the validity of upscreening for use in extreme circumstances. ESA

N91-32379# Tecnologica S.A., La Laguna (Spain).

CPFS: THE TOTAL INFORMATION SYSTEM TOOL FOR EEE-PARTS PROCUREMENT

F. GARRIDO *In* ESA, ESA Electronic Components Conference p 555-560 Mar. 1991

Copyright Avail: NTIS HC/MF A25; EPD, ESTEC, Noordwijk, Netherlands, HC 90 Dutch guilders

The philosophy used in the development and design of the CPFS system and the advantages that a system of this nature presents are discussed. The high number of EEE (Electrical, Electronic and Electromechanics) parts which are needed for a given project along with the detailed technical and administrative definition, demands perfect management of the information that is generated for each single item of a project's part list. CPFS is a rationalized computing system which takes into account that a medium size project handles hundreds of different items each of which has its own identity. The handling of the technical, cost and schedule information, requires a computerized process which guarantees the quality of the information managed in two different and fundamental aspects: information reliability and traceability. ESA

N91-32390*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

EVALUATION OF ADVANCED MICROELECTRONICS FOR INCLUSION IN MIL-STD-975

W. RICHARD SCOTT *In* ESA, ESA Electronic Components Conference p 611-614 Mar. 1991

Copyright Avail: NTIS HC/MF A25; EPD, ESTEC, Noordwijk, Netherlands, HC 90 Dutch guilders CSCL 09/3

The approach taken by NASA and JPL (Jet Propulsion Laboratory) in the development of a MIL-STD-975 section which contains advanced technology such as Large Scale Integration and Very Large Scale Integration (LSI/VLSI) microelectronic devices is described. The parts listed in this section are recommended as satisfactory for NASA flight applications, in the absence of alternate qualified devices, based on satisfactory results of a vendor capability audit, the availability of sufficient characterization and reliability data from the manufacturers and users and negotiated detail procurement specifications. The criteria used in the selection and evaluation of the vendors and candidate parts, the preparation of procurement specifications, and the status of this activity are discussed. ESA

N91-32393# ANT Nachrichtentechnik, Backnang (Germany, F.R.).

SPECIFICATION, PROCUREMENT AND TESTING OF PASSIVATED MICROWAVE SEMICONDUCTOR CHIPS FOR SPACE APPLICATIONS

REINHOLD L. ZAHN and PETRA K. SCHUMACHER In ESA, ESA Electronic Components Conference p 627-632 Mar. 1991 Copyright Avail: NTIS HC/MF A25; EPD, ESTEC, Noordwijk, Netherlands, HC 90 Dutch guilders

Employing passivated microwave semiconductor chip devices in space systems is a challenge for both applications engineering and parts procurement. The use of chip devices results in miniature circuits as well as optimum circuit performance. The signal to noise ratio and power consumption are improved. With the demand for higher frequencies the dimensions become smaller with associated handling difficulties and problems with regard to chip assembly. The status of procurement specifications applicable to microwave semiconductor chip devices is reviewed, using the ESA/PSS-01-608. Key items for useful procurement specifications are highlighted. Results of testing and handling investigations on low noise microwave Field Effect Transistors (MESFET) chips are described. ESA

N91-32998# Krupp Widia G.m.b.H., Essen (Germany, F.R.).

EUROPE 1993: CHALLENGE AND OPPORTUNITY FOR DISTRIBUTION LOGISTICS

HANS PEGELS In Krupp (Fried.) G.m.b.H., Krupp Technical Reports, Number 2, December 1990 (English Version) p 103-112 Dec. 1990

Avail: NTIS HC/MF A04

The single European market will be the world's second biggest market. If the opportunities this creates are to be exploited successfully over the long term, the key decisions have to be taken now. Decisive importance will attach to a reorientation of strategies for market approach, product mix, production structures, and above all distribution logistics. These aforementioned subjects are discussed. ESA

09

RELIABILITY AND QUALITY CONTROL

Includes Fault Tolerance, Failure and Error Analysis, Reliability Engineering, Quality Assurance, Wear, Safety Management and Safety, Standards and Measurement, Tests and Testing Inspections, Specifications, Performance Tests, Certification.

A91-10137#

SAFETY RISK ASSESSMENT ON THE SPACE STATION FREEDOM

STAN KAPLAN (PLG, Inc., Newport Beach, CA) AIAA, Space Programs and Technologies Conference, Huntsville, AL, Sept. 25-27, 1990. 12 p.

(AIAA PAPER 90-3771) Copyright

The discipline of probabilistic risk assessment (PRA), viewed as both a part of the design process and a conceptual framework for all the laboratories and contractors, is discussed with respect to the Space Station Freedom. The basic premise is that risk is a property of an engineered system just like weight, thrust, and payload capacity. A quantitative definition of risk is given; sets of scenarios are identified and structured into categories which constitute the basis of a risk model. B.P.

A91-13076

AUTONOMY, INTERDEPENDENCE, AND SOCIAL CONTROL - NASA AND THE SPACE SHUTTLE CHALLENGER

DIANE VAUGHAN (Boston College, MA) Administrative Science Quarterly (ISSN 0001-8392), vol. 35, June 1990, p. 225-257. Research supported by the University of Oxford and American Bar Foundation. refs

Copyright

This paper shows that the organizations responsible for regulating safety at the National Aeronautics and Space Administration (NASA) failed to identify flaws in management procedures and technical design that, if corrected, might have prevented the Challenger tragedy. Analysis of the processes of discovery, monitoring, investigation, and sanctioning in the Space Shuttle Program indicates that regulatory effectiveness was inhibited by the autonomy and interdependence of NASA and its regulators. This discovery suggests that autonomy and interdependence, concepts developed from research on the external control of organizations, are applicable to the study of intraorganizational regulatory relationships. Moreover, by articulating the organizational contribution to technical failure, this research challenges existing assumptions about the social control of risky technologies. Author

A91-14750#

A STATISTICAL APPROACH TO VENDOR CERTIFICATION

R. HORNER, C. CHAVEZ (Westinghouse Electric Corp., Baltimore, MD), K. SHORMAN, D. ELLIOTT (Texas Instruments Defense Systems and Electronics Group, Dallas, TX), B. SEMANS (Dielectric Laboratories, Inc., New York) et al. AIAA, Total Quality Management Symposium, 2nd, Baltimore, MD, Nov. 14-16, 1990. 7 p.

(AIAA PAPER 90-4047) Copyright

This successful vendor certification program focuses on the quantification and analysis of performance factors. The goal of the program is to guarantee material quality and to reduce or eliminate incoming test and inspection. The performance factors include cost, schedule, and quality characteristics. All aspects of these factors are quantified for reference and for management decisions. This pilot program successfully demonstrates the feasibility of implementing a supplier management program based on quantitative information. Three pilot suppliers were required to meet or exceed a process capability index (Cpk) of 1.33. A Cpk of 1.33 is equivalent to defect rates less than 100 parts per million. Under such a requirement, design and production operations can perform consistently with minimum variability. The success of this program is demonstrated by a case study. Author

A91-24875# National Aeronautics and Space Administration, Lyndon B. Johnson Space Center, Houston, TX.

QUALITY ASSURANCE PLANNING FOR LUNAR MARS EXPLORATION

KAY MYERS (NASA, Johnson Space Center; Barrios Technology, Inc., Houston, TX) Total Quality Management Conference, Palm Springs, CA, Feb. 7, 8, 1991, Paper. 7 p.

A review is presented of the tools and techniques required to meet the challenge of total quality in the goal of traveling to Mars and returning to the moon. One program used by NASA to ensure the integrity of baselined requirements documents is configuration management (CM). CM is defined as an integrated management process that documents and identifies the functional and physical characteristics of a facility's systems, structures, computer software, and components. It also ensures that changes to these characteristics are properly assessed, developed, approved,

implemented, verified, recorded, and incorporated into the facility's documentation. Three principal areas are discussed that will realize significant efficiencies and enhanced effectiveness, change assessment, change avoidance, and requirements management.

R.E.P.

A91-29054

CO-OPERATION IS CRUCIAL TO SUCCESS OF AGING AIRCRAFT REVIEW PROGRAMMES

COLIN TORKINGTON (Australia's Civil Aviation Authority, Canberra) ICAO Journal (ISSN 0018-8778), vol. 45, Nov. 1990, p. 15-20.

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An outline is presented of structural design concepts involved in the continuing programs associated with aging commercial aircraft inspections. The safe life concept requires that those parts of the structure whose failure could result in loss of the aircraft must be able to remain safely in use up to a predetermined retirement life. Although safe life components are now rarely utilized in the primary flight structure of commercial aircraft, many older safe life designs are still operating. Other design concepts described include the fail-safe concept, damage tolerance evaluation, the supplemental inspection document (SID) that was introduced to bring the aircraft up to a safety level equivalent to the new damage tolerance rules, and the Boeing approach to the SID audit approach. Additional concepts and recommendations are discussed, including research work, tear-down inspections of old aircraft, fatigue testing, nondestructive testing techniques, communication, human factors, and maintenance.

R.E.P.

A91-30936

CONTROL DATA CORPORATION'S GOVERNMENT SYSTEMS GROUP STANDARD SOFTWARE QUALITY PROGRAM

GENE REDIG and MIKE SWANSON (Control Data Corp., Bloomington, MN) IN: NAECON 90; Proceedings of the IEEE National Aerospace and Electronics Conference, Dayton, OH, May 21-25, 1990. Vol. 2. New York, Institute of Electrical and Electronics Engineers, Inc., 1990, p. 670-674.

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The authors describe the necessity of developing the Government Systems Group standard Software Quality Program (SQP), the background in developing the SQP, the advantages of the SQP, the components of the SQP, and the highlights of the SQP. The goal of the standard SQP was to develop common and reusable quality processes. The SQP will produce quality products, while the plan offers the advantages of compliancy, reusability, efficiency, effectiveness, consistency, cost savings, and portability. The components of the SQP include the policy, organization, plan, and handbook. The main elements of the SQP, which currently reflects government standards DOD-STD-2167A and DOD-STD-2168 for software development projects, are discussed. This standard SQP was developed using the total quality management process methodologies. The influence that the Software Engineering Institute's Capability Assessment had on developing and implementing this standard SQP is also discussed.

I.E.

A91-31019

TOTAL QUALITY IN THE DESIGN PROCESS

RICHARD G. KARM (Texas Instruments, Inc., Dallas) IN: NAECON 90; Proceedings of the IEEE National Aerospace and Electronics Conference, Dayton, OH, May 21-25, 1990. Vol. 3. New York, Institute of Electrical and Electronics Engineers, Inc., 1990, p. 1284-1286.

Copyright

The advantages to be gained from the use of technology in the quest for quality improvement are considered. The scope includes not only the traditional manufacturing and automation efforts, but also the large opportunity in the design functions. Considered gains in manufacturing have been achieved through the judicious use of automation, computer-integrated-manufacturing, and statistical process control. In the quest for continuous quality improvement, the next major

step function improvement will come from changes in the design methodology. The ways in which artificial intelligence, design of experiments, and engineering workstations can be used to truly change design methodology, and not just automate the present methods, are studied.

I.E.

A91-31020

HARDWARE QUALITY AUDITS - A BETTER APPROACH

KENNETH SMITH and DALE SHIELDS (Modern Technologies Corp., Dayton, OH) IN: NAECON 90; Proceedings of the IEEE National Aerospace and Electronics Conference, Dayton, OH, May 21-25, 1990. Vol. 3. New York, Institute of Electrical and Electronics Engineers, Inc., 1990, p. 1287-1293. refs

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The Air Force has recently released regulations that require that full-scale engineering development or production contracts implement a procedure for the teardown and inspection of selected components, major subsystems, and/or contract end items. An improved approach to compliance is presented. A structured approach to hardware quality audits (HQAs) is described which consists of five steps, as follows: (1) Precisely define HQA requirements in the full-scale engineering development statement of work (SOW); (2) Establish an HQA plan, including analysis items and schedule; (3) Objectively define the elements of the HQA evaluation process; (4) Analyze, report, and track HQA assessments using the hardware audit paperless system (HAPS) model; and (5) Reward contractor HQA achievements.

I.E.

A91-31021

QUALITY ECONOMICS AND PRODUCTIVITY

YOSEPH BESTER (Elbit Computers, Ltd., Haifa, Israel) IN: NAECON 90; Proceedings of the IEEE National Aerospace and Electronics Conference, Dayton, OH, May 21-25, 1990. Vol. 3. New York, Institute of Electrical and Electronics Engineers, Inc., 1990, p. 1294-1298.

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The quality economics principle establishes the relationship between the value of quality and the cost of quality. The manager of the quality function in an organization is guided by this principle in the task of insuring that the quality value of the outputs of the organization is higher than the investment made (cost of quality) to achieve that quality, and thereby contributes to the maximization of the return on investment and profit in the organization. A review is presented to show that the responsibility of the manager of the quality function in the organization has increased in scope to include productivity, associated with quality-related activities in particular, and production work in general.

I.E.

A91-33640

FAILURE MANAGEMENT IN SPATIO-TEMPORAL REDUNDANT, INTEGRATED NAVIGATION AND FLIGHT CONTROL REFERENCE-SYSTEMS

UWE K. KROGMANN (Bodenseewerk Geraetetechnik GmbH, Ueberlingen, Federal Republic of Germany) IN: IEEE PLANS '90 - Position Location and Navigation Symposium, Las Vegas, NV, Mar. 20-23, 1990, Record. New York, Institute of Electrical and Electronics Engineers, Inc., 1990, p. 330-337.

Copyright

Failure management techniques for highly reliable, fault-tolerant inertial reference systems are described. Cost, weight, and power considerations imply the use of a minimum number of inertial sensors in a skewed geometry. Fault-tolerant hardware performance is obtained by spatially separated channels with a preceptron-type information flow. Data diversity in temporally separated software channels yields software fault tolerance. Advanced vector space procedures for fault detection, localization, masking, and dynamic system reconfiguration permit safe and quick response, yielding minimal data and recovery latency.

I.E.

A91-36939

IMPLEMENTING SPC IN COMPOSITES MANUFACTURING

LEIGH REID (LTV Aircraft Products Group, Dallas, TX) Society

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of Manufacturing Engineers, Conference on Fabricating Composites '90, Arlington, TX, Oct. 8-11, 1990. 12 p.
(SME PAPER EM90-656) Copyright

Composite materials are extremely sensitive to variability in the manufacturing process. Statistical process control (SPC) methods provide a way to continuously monitor processes and detect excessive or unnatural variability before problems can compromise product quality. LTV Aircraft Products Group (LTVAPG) is implementing SPC and other variability reduction methods in the composites manufacturing areas at its Jefferson Avenue facility in Dallas. As part of group-wide efforts in SPC and continuous process improvement, multi-functional SPC application teams analyze each step in the manufacturing process, install appropriate process monitoring mechanisms, improve the capability of the process, and develop process control plans. Special implementation issues deriving from the nature of composites manufacturing are discussed, and guidelines for implementing SPC in composites manufacturing are provided. Author

A91-40553

SYSTEMS SAFETY INCLUDING DOD STANDARDS

DONALD M. LAYTON Chesterland, OH, Weber Systems, Inc., 1989, 175 p.
Copyright

The stated purpose of MIL STD 882B (1984), which is currently the basis of all U.S. DOD criteria in the field of systems safety design and analysis, is 'To provide uniform requirements for developing and implementing a system safety program of sufficient comprehensiveness to identify the hazards of a system, and to impose design requirements and management controls to prevent mishaps by eliminating hazards or reducing the associated risk to a level acceptable to the managing activity.' Attention is presently given to safety-related issues in material acquisition activities, as well as over the course of a system's life cycle, together with accounts of current hazard-analysis techniques, risk management and system-safety control methods, human factors, and the role of interfaces. O.C.

A91-41439

THE EUROPEAN ATC SYSTEM - CONSTRAINTS AND TRAFFIC MANAGEMENT

PETER BROOKER (Civil Aviation Authority, London, England) (Royal Institute of Navigation, Meeting on Management of Air Traffic Flow in Europe, London, England, Nov. 15, 1989) Journal of Navigation (ISSN 0373-4633), vol. 43, May 1990, p. 187-194.
Copyright

Current problems of the air traffic control system in Europe are examined. Ideas and measures that will yield benefits in the short and medium term by the mid-1990s are explored. These include ATC sector capacity estimation, area navigation, computer-based data processing interfacing between states and Eurocontrol, more accurate short-term traffic flow rate projections, more airport capacity and airport routings, complete restructuring of the airspace to simplify air traffic control, use of airborne collision avoidance systems, ACAS, and computer simulation system modelling. V.I.

A91-41440

THE PROGRESSIVE IMPROVEMENT OF EUROPEAN FLOW-MANAGEMENT

BRIAN EDWARDS (National Air Traffic Services, London, England) (Royal Institute of Navigation, Meeting on Management of Air Traffic Flow in Europe, London, England, Nov. 15, 1989) Journal of Navigation (ISSN 0373-4633), vol. 43, May 1990, p. 195-203.
Copyright

Developments in European air traffic flow-management, techniques being used, present organization, and existing problems are defined. The question of how air traffic control system capacity is currently assessed is answered, covering topics such as the availability of new capacity, the optimization of the use of the existing route structure, and alternatives. The paper discusses the present European flow organization and its problems and central

flow-management unit development as the ultimate solution. The Eurocontrol Data Bank and its functions are also discussed, and interim development phases are described. V.I.

A91-41441

THE AIRLINE'S PERCEPTION OF AIR TRAFFIC MANAGEMENT

COLIN HUME (British Airways, PLC, London, England) (Royal Institute of Navigation, Meeting on Management of Air Traffic Flow in Europe, London, England, Nov. 15, 1989) Journal of Navigation (ISSN 0373-4633), vol. 43, May 1990, p. 204-208.
Copyright

The very frustrating present situation of air traffic flow-management (ATFM) is described. Problems such as the ability to use published ATS routes and the limitations set by the European traffic orientation system, and significant improvements made within the last 18 months, such as the introduction of the Central Executive Unit, are covered. Qualified as important for the future of air traffic management are the development of a central flow-management unit under Eurocontrol, the creation of a central executive unit, internationally staffed, acting as the decision maker and executive for European traffic flows, and the establishment of a program targeted to harmonize ATC and ATFM into a single, integrated service. V.I.

A91-41442

ALTERNATIVE STRATEGIES FOR TRAFFIC FLOW-MANAGEMENT IN EUROPE

S. RATCLIFFE (Royal Institute of Navigation, Meeting on Management of Air Traffic Flow in Europe, London, England, Nov. 15, 1989) Journal of Navigation (ISSN 0373-4633), vol. 43, May 1990, p. 209-214. refs
Copyright

Some of the principles on which en-route airspace is presently allocated are challenged, and the practical difficulties of implementing any alternative strategy are pointed out. The possibility of an alternative system in which air traffic is self-regulating when in cruise, provided that there is a means for air-to-air exchange, not only of position data but also of intention for the next 15 minutes or so of flight is considered, in addition to the possible need for an extra pilot, which includes provision of airborne data links having a capacity exceeding that of SSR Mode S or that contemplated by the ICAO FANS study. Therefore, it is made clear that a considerable time must elapse before such a self-regulating system could be adopted. Automation of traffic surveillance and collision avoidance do not offer increase in capacity, except on a very extended time-scale. A centralized flow facility is offered as the possibility of diminishing the difficulties of airspace congestion as a semipermanent characteristic. The need for safety is considered ATC's dominant problem. V.I.

A91-44612#

AN ANALYTICAL APPROACH TO RELIABILITY, FAILURE FORECASTING AND PRODUCT QUALITY

JAMES L. BYERS (Byers and Associates, Warminster, PA) ASME, International Gas Turbine and Aeroengine Congress and Exposition, 35th, Brussels, Belgium, June 11-14, 1990. 7 p. refs
(ASME PAPER 90-GT-190)

The subject of putting quality of product and service in the forefront of the efforts of the U.S. Government and its contractors as well as producers of ordinary commercial problems is addressed on the basis of military experience. The present study examines a typical problem of failures impacting quality and the resulting warranty difficulty and shows how it can be solved by quantifying the future failure frequency or by failure forecasting. Once this is done it is possible to simply quantify the degree of improvement required and to control the costs in making the needed repairs. Since the failure forecasting solution can be done entirely on a desktop PC, it is not a complicated or long drawn-out process. Almost any conceivable product can be treated in this manner using the software available once a simple procedure is learned. P.D.

A91-48193

INTERDEPENDENCE BETWEEN SAFETY-CONTROL POLICY AND MULTIPLE-SENSOR SCHEMES VIA DEMPSTER-SHAFER THEORY

TOSHIYUKI INAGAKI (Tsukuba, University, Japan) IEEE Transactions on Reliability (ISSN 0018-9529), vol. 40, June 1991, p. 182-188. refs

(Contract MOESC-01550320)

Copyright

The Dempster-Shafer (D-S) theory has been gaining popularity in fields where incomplete knowledge is a factor. The author explores the application of the D-S theory in system reliability and safety. Inappropriate application of the D-S theory to safety-control policies can degrade plant safety. This is proven in two phases: (1) a unified combination rule for fusing information on plant states given by independent knowledge sources such as sensors or human operators is developed; and (2) combination rules cannot be chosen in an arbitrary manner; i.e., the best choice of combination rules depends on whether the safety-control policy is fault-warning or safety-preservation. I.E.

N91-10297# Rolls-Royce Ltd., Derby (England).

INTRODUCTION: NEEDS AND APPROACHES TO RELIABILITY AND QUALITY ASSURANCE IN DESIGN AND MANUFACTURE

A. C. PICKARD 6 Oct. 1989 8 p Presented at AGARD Damage Tolerance Concept Review Conference, Brussels, Belgium, 1-6 Oct. 1989

(PNR-90683; ETN-90-97930) Copyright Avail: NTIS HC/MF A02

In the damage tolerance approach, for improving the integrity of aero engines, reliability, and quality assurance issues are discussed. The implications of the following aspects on the damage tolerance concept are investigated: component material specifications and standards, controls on manufacturing processes, design systems and quality assurance. The subjects reviewed in the workshop on reliability and quality assurance are given. ESA

N91-10298# Rolls-Royce Ltd., Derby (England).

TOTAL QUALITY MANAGEMENT AT ROLLS-ROYCE PLC

R. H. WEDGE 15 Sep. 1990 10 p Submitted for publication (PNR-90759; ETN-90-97961) Copyright Avail: NTIS HC/MF A02

The Rolls-Royce concept concerning quality and quality management is reviewed. The work is focused on the business associated with aircraft gas turbine manufacture. The reasons for the adoption of quality assurance methods and the company's targets are justified. The distribution of responsibilities and tasks in the quality assurance chain is explained. Resulting from the management plans, more effort is accorded to elimination and prevention, so that less time is spent on detection and correction. ESA

N91-16393# Pacific Northwest Lab., Richland, WA.

PROCEDURES FOR QUALITY ASSURANCE PROGRAM

R. L. SCHAUB and D. E. RYDER Dec. 1989 384 p

(Contract DE-AC06-76RL-01830)

(DE90-010001; PNL-MA-70-VOL-1) Avail: NTIS HC/MF A17

These administrative procedures were developed to implement the quality assurance program described in PNL-MA-70, Quality Assurance Manual. The manual and procedures establish requirements, responsibilities, and methods for execution of the program consistent with U.S. Department of Energy (DOE) policies and requirements. When specified by a QA Plan, a Statement of Work or other governing document, PNL activities affecting quality shall be performed in accordance with the administrative procedures. The procedures are controlled documents assigned to the person named on the cover sheet. The assignee is responsible for maintaining the procedures in an up-to-date condition, consistent with Controlled Document Lists, by incorporating subsequent changes or new procedures promptly as they are issued. These procedures shall be available and used at the location where the prescribed activity is performed. A Controlled Document List (CDL) for each type of administrative procedure is

included for use as a table of contents. The CDL lists procedure numbers, titles, revisions and/or amendments and the effective date. Work shall be performed in accordance with the latest effective procedure revision and/or amendment identified in the CDL unless a Controlled Document Transmittal Record (CDT/R), a QA Plan, or a Statement of Work allows or requires otherwise. This document is Volume 1 of a two volume set. DOE

N91-17623*# California Univ., Irvine. Dept. of Information and Computer Science.

SOFTWARE SAFETY

NANCY LEVESON Jul. 1987 110 p

(Contract NCC9-16)

(NASA-CR-187920; NAS 1.26:187920) Copyright Avail: NTIS

HC/MF A06 CSCL 09/2

Software safety and its relationship to other qualities are discussed. It is shown that standard reliability and fault tolerance techniques will not solve the safety problem for the present. A new attitude requires: looking at what you do NOT want software to do along with what you want it to do; and assuming things will go wrong. New procedures and changes to entire software development process are necessary: special software safety analysis techniques are needed; and design techniques, especially eliminating complexity, can be very helpful. Y.S.

N91-18608# L and S Computer Technology, Inc., Austin, TX.

PERFORMANCE ENGINEERING FOR MISSION CRITICAL EMBEDDED COMPUTER SYSTEMS Final Report

Jun. 1990 68 p

(Contract N00039-86-C-0247)

(AD-A228643; NOSC/TD-1834) Avail: NTIS HC/MF A04 CSCL 12/7

Background information is provided on performance engineering and the POD performance modeling tool, and an overview is given of the project activities. Finally, the project summary section reviews the results, lessons learned, and suggests future direction. Naval mission critical, embedded computer systems (MC-ECS) must respond to external events within their allotted time, otherwise they fail. Failures may have life or death consequences. Lifecycle performance management, or performance engineering (PE), calls for building performance into systems beginning in the requirements definition phase, and continuing the performance management through the design, implementation, testing, and post deployment phases. Experience with PE shows that it can detect and avoid project threatening performance failures in sufficient time to correct them and enable timely delivery of a quality product. Furthermore, performance is orders of magnitude better with this approach than with a fix-it later approach in which performance considerations are deferred to the testing phase and, when necessary, tuning attempts to correct performance failures. Better performance means both people and computer resources can be used to enhance the functionality of the system rather than to correct performance deficiencies. GRA

N91-19974# Committee on Commerce, Science, and Transportation (U.S. Senate).

HUBBLE SPACE TELESCOPE AND THE SPACE SHUTTLE PROBLEMS

Washington GPO 1990 59 p Hearing before the Committee on Commerce, Science, and Transportation, 101st Congress, 2d Session, 10 Jul. 1990

(S-HRG-101-1087; GPO-36-688) Avail: Subcommittee on Science, Technology, and Space, Senate, Washington, DC 20510 HC free; also available SOD HC \$2.00 as 552-070-09632-9

Hearings before the Subcommittee on Science, Technology, and Space of the Senate Committee on Commerce, Science, and Transportation are presented on oversight on recent problems with the Hubble space telescope and the space shuttle. The question of testing versus a test's costs, risks, and information yield are discussed as well as, lessons learned in management. The Subcommittee reviewed NASA's quality control procedures, the adequacy of Congressional and Office of Management and

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Budget support, and government's verification responsibilities. Oral and written testimony from NASA management and pertinent contractors is included. J.P.S.

N91-21178# Aerospace Corp., El Segundo, CA.
QUALITY FUNCTION DEPLOYMENT IN LAUNCH OPERATIONS

P. L. PORTANOVA and E. J. TOMEI, JR. 23 Nov. 1990 84 p
(Contract F04701-88-C-0089)
(AD-A230983; TOR-0091(6561-04)-1) Avail: NTIS HC/MF A05 CSCL 05/1

The goal of the Advanced Launch System (ALS) is a more efficient launch capability that provides a highly reliable and operable system at substantially lower cost than current launch systems. Total Quality Management (TQM) principles are being emphasized throughout the ALS program. A continuous improvement philosophy is directed toward satisfying users' and customer's requirements in terms of quality, performance, schedule, and cost. Quality Function Deployment (QFD) is interpreted as the voice of the customer (or user), and it is an important planning tool in translating these requirements throughout the whole process of design, development, manufacture, and operations. This report explores the application of QFD methodology to launch operations, including the modification and addition of events (operations planning) in the engineering development cycle, and presents an informal status of study results to date. QFD is a technique for systematically analyzing the customer's (Space Command) perceptions of what constitutes a highly reliable and operable system and functionally breaking down those attributes to identify the critical characteristics that determine an efficient launch system capability. In applying the principle of QFD, a series of matrices or charts are developed with emphasis on the one commonly known as the House of Quality (because of its roof-like format), which identifies and translates the most critical information. GRA

N91-21552# Air War Coll., Maxwell AFB, AL.
TOP QUALITY MANAGEMENT, RELIABILITY, AND MAINTAINABILITY: INSTITUTIONAL GOALS WITH BUILT IN BARRIERS

PHILIP B. AITKEN-CADE 1990 71 p
(AD-A230134) Avail: NTIS HC/MF A04 CSCL 05/1

Total quality management (TQM) has been heralded as the process that will finally cause a cultural change throughout government and industry to usher in a new era of continuously increasing quality. Since the system appears to be slow to react to the change in culture, there may be institutional impediments that are preventing the Air Force from achieving all that it can in reliability and maintainability (R and M) and TQM. However, the study concludes that there are no concrete institutional barriers preventing the Air Force from reaching the goal of TQM. There are only opportunities for senior leaders to demonstrate their commitment to the TQM program. All members of the Air Force and industry must work toward continuous improvement in all facets of the system and the senior leaders must set the pace. Industry has instituted various forms of TQM (after all, TQM is defined in many different ways) and does not need the Government to dictate implementation plans. The success of the Air Force TQM program will depend on the extent to which its senior leaders are prepared to apply the concept of KAIZEN - gradual, unending improvement, doing little things better; setting and achieving ever-higher standards. GRA

N91-22778*# Mitre Corp., Houston, TX.
A FAILURE RECOVERY PLANNING PROTOTYPE FOR SPACE STATION FREEDOM

DAVID G. HAMMEN and CHRISTINE M. KELLY in NASA.
Goddard Space Flight Center, The 1991 Goddard Conference on Space Applications of Artificial Intelligence p 113-127 May 1991
(Contract NAS9-18057)

Avail: NTIS HC/MF A16 CSCL 09/2

NASA is investigating the use of advanced automation to enhance crew productivity for Space Station Freedom in numerous

areas, including failure management. A prototype is described that uses various advanced automation techniques to generate courses of action whose intents are to recover from a diagnosed failure, and to do so within the constraints levied by the failure and by Freedom's configuration and operating conditions. Author

N91-26555# Pacific Northwest Lab., Richland, WA.
QUALITY ASSURANCE MANUAL

R. L. SHAUB and D. E. RYDER Apr. 1991 72 p
(Contract DE-AC06-76RL-01830)
(DE91-012618; PNL-MA-70) Avail: NTIS HC/MF A04

In order to provide clients with quality products and services, Pacific Northwest Laboratory (PNL) has established and implemented a formal quality assurance program. These management controls are documented in this manual (PNL-MA-70) and its accompanying standards and procedures. The QA Program meets the basic requirements and supplements of ANSI/ASME NQA-1-1986 Edition, Quality Assurance Program Requirements for Nuclear Facilities, except as noted in specific sections of this manual. This manual provides topical requirements and an overview of the administrative procedures that apply to Impact Level 1 and 2 projects and activities. DOE

N91-26994# Rome Air Development Center, Griffiss AFB, NY.
MEASURING THE QUALITY OF KNOWLEDGE WORK

ANTHONY COPPOLA Apr. 1991 25 p
(Contract AF PROJ. 2338)
(AD-A235354; RL-TR-91-48) Avail: NTIS HC/MF A03 CSCL 05/1

There are a variety of ways in which the quality of knowledge work can be measured, depending on the definition of quality and the intended use of the measure. This report summarizes these for the guidance of the managers of knowledge workers, such as the engineers and scientists of Government laboratories. GRA

N91-27757# National Inst. of Standards and Technology, Gaithersburg, MD. Office Systems Engineering Group.
GOVERNMENT DOCUMENT PROCESSING REQUIREMENTS REPORT

R. F. SIES Apr. 1991 16 p
(PB91-187773; NISTIR-4560) Avail: NTIS HC/MF A03 CSCL 05/2

Several activities are described of the Office Systems Engineering Group in the area of electronic publishing standards. An account is given of the July 30, 1990 workshop on Electronic Information Exchange Standards Used in Document Processing Applications and the list of User Requirements that came out of that workshop. Other efforts are reported which were made to help bring about the harmonization of electronic publishing standards. Author

N91-30198# European Space Agency. European Space Research and Technology Center, ESTEC, Noordwijk (Netherlands). Materials and Processes Div.

THE CONTROL OF LIMITED-LIFE MATERIALS

Dec. 1990 14 p
(ESA-PSS-01-722-ISSUE-2; ISSN-0379-4059; ETN-91-99828)
Copyright Avail: NTIS HC/MF A03

The procedure to be used for the control of limited life materials employed in the fabrication of ESA spacecraft and associated equipment is specified. The areas covered are hazards and safety precautions, material control, procurement documents, identification, storage and handling. Control of material life includes assessment of shelf life, extension of shelf life and disposal of non certifiable materials. Acceptance criteria and recertification testing are outlined. Quality control criteria concerning data nonconformance, calibration and traceability are discussed. ESA

N91-30544# Wichita State Univ., KS. National Inst. for Aviation Research.

KQIN: KANSAS QUALITY IMPROVEMENT NETWORK. A REPORT OUTLINING A STATEWIDE QUALITY IMPROVEMENT PLAN

GEORGE HEINRICH and ANNE GALLAGHER Jul. 1991 93 p
Sponsored by Kansas Technology Enterprise Corp.
(NIAR-91-20) Avail: NTIS HC/MF A05

A plan is described for the implementation of the Kansas Quality Improvement Network (KQIN). Objectives include providing a support system for business organizations initiating Total Quality Management (TQM) programs, raising the awareness of TQM and working with Kansas educational institutions to both update their curricula in the TQM area and to implement TQM techniques in their operations. The KQIN plan would allow Kansas to become more competitive with other Midwestern states that have already implemented quality improvement networks. Author

N91-30987# General Accounting Office, Washington, DC. National Security and International Affairs Div.

SPACE PROJECT TESTING: UNIFORM POLICIES AND ADDED CONTROLS WOULD STRENGTHEN TESTING ACTIVITIES

Sep. 1991 42 p
(GAO/NSIAD-91-248; B-245141) Avail: NTIS HC/MF A03

The General Accounting Office (GAO) reviewed the National Aeronautics and Space Administration's (NASA) testing activities to assess the adequacy of NASA's testing policies and practices, NASA's oversight of contractor testing, and the adequacy of resources available for testing. Because space missions are inherently risky, systems cannot be easily repaired while in orbit, and failures are widely publicized, it is especially important that system performance be thoroughly tested before launch. These complex systems are usually acquired in very limited quantities, and test programs are specifically tailored for each project. In this report, GAO recommends that the NASA Administrator: (1) define and issue testing policies regarding testing goals, minimum requirements, and organizational roles and responsibilities for ensuring that tests are properly planned, conducted, and reported; (2) establish agencywide test standards; and (3) make specific improvements in contractor testing oversight such as increasing the level of civil servants' knowledge and skills to enable them to better critique technical contractor designs, tests, and operations. J.P.S.

N91-31013# Universiteit Twente, Enschede (Netherlands). Dept. of Information Systems.

QUALITY ASSURANCE IN THE MANAGEMENT OF INFORMATION SYSTEMS

L. J. B. ESSINK Dec. 1990 29 p
(MEMO-INF-90-90; ISSN-0923-1714; ETN-91-99681) Avail: NTIS HC/MF A03

Quality assurance in relation to the planning development, introduction and maintenance of automated information systems is addressed. Quality is threatened by inadequate organization of the process, the lack of operational quality criteria and misinterpretation of needs. Quality problems are emerging from a number of well known pitfalls of IS (Information Systems) development in practice. These pitfalls give a good indication of 'why information systems fail'. The implementation of a quality system in the organization to monitor organizational structures, the quality of specifications, procedures and processes is a necessity. The needs and structure of such a quality assurance system are outlined. A framework that enables a clear distinction of the different aspects of the management of IS is presented. In the framework different models for analyzing quality requirements and management structures of IS development are treated. The critical success factors of IS development are outlined. The term 'critical success factor' stands for a condition, a control variable or circumstance that has to be managed properly in order to achieve an 'optimal' organizational setting contributing to the success of a development process. ESA

N91-32366# Arge-Detecon, Bonn (Germany, F.R.).
EXPERIENCES WITH COMPONENTS IN THE DFS-PROJECT: SEEN FROM A CUSTOMER'S POINT OF VIEW

D. JOHST /n ESA, ESA Electronic Components Conference p 481-483 Mar. 1991

Copyright Avail: NTIS HC/MF A25; EPD, ESTEC, Noordwijk, Netherlands, HC 90 Dutch guilders

Experiences with components in the German telecommunications satellite project DFS are addressed. The nature of most problems related to product assurance is that they occur late in the programs. Sometimes they occur so late, that corrective measures have a considerable risk impact on the customer and a considerable financial impact on the contractor. It is recommended that the activities in the field of product assurance be intensified and accelerated at the source, the component manufacturer, in order to avoid these problems in the future and benefit both contractor and customer. ESA

N91-32367# Centre National d'Etudes Spatiales, Toulouse (France). Components Div.

SUMMARY OF EEE COMPONENT ANOMALIES ENCOUNTERED IN THE SPOT LINE OF EARTH OBSERVATION SATELLITES AND LESSONS DERIVED THEREFROM FOR FUTURE GENERATIONS

F. LINDER, S. PONOMARENKO, D. LACROIX, and X. PENOU /n ESA, ESA Electronic Components Conference p 485-490 Mar. 1991

Copyright Avail: NTIS HC/MF A25; EPD, ESTEC, Noordwijk, Netherlands, HC 90 Dutch guilders

The results of Electric, Electronic, and Electromechanical (EEE) component activities applied to French Earth observation satellites of the SPOT family are discussed. The SPOT program and the different satellites in the family are described. Emphasis is given to the components used. The component selection policy is described and results are given in terms of number of types, manufacturers, and quantities used. Details concerning the procurement of SPOT components in terms of screening, quality levels, and procurement aspects are reviewed. Component incidents and problems encountered during the development of SPOT satellites are discussed. The details and analysis of all incidents are given. Actions taken for the next generation of satellites are presented. ESA

N91-32378# IGG Component Technology Ltd., Portsmouth (England).

THE MERITS OF AN INDEPENDENT PRE-CAP INSPECTION

J. A. JONES /n ESA, ESA Electronic Components Conference p 549-554 Mar. 1991

Copyright Avail: NTIS HC/MF A25; EPD, ESTEC, Noordwijk, Netherlands, HC 90 Dutch guilders

Results of routine destructive physical analysis carried out on monolithic integrated circuits are presented. Circuits meant to meet MIL-STD-883 level B screening flow show consistent failure under destructive physical analysis tests. Potential reliability hazards associated with this failure are discussed. It is concluded that little reliance can be placed on manufacturers to perform pre-cap inspection and wafer-Scanning Electron Microscope (SEM) acceptance if there is no independent monitoring. SEM photographs are shown of representative manufacturing defects in the circuits tested. ESA

N91-32381# National Space Development Agency, Tokyo (Japan). Reliability Assurance Dept.

A PLAN OF NASDA'S PARTS DATABASE IN THE RELIABILITY INFORMATION SYSTEM

KOICHI SHINOKAZI /n ESA, ESA Electronic Components Conference p 567-568 Mar. 1991

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The National Space Development Agency of Japan (NASDA) is developing a reliability information system. Present and future NASDA reliability analysis software and parts databases for parts development, parts management, reliability design, etc. are described. A computer database including information on the NASDA's Qualified Products List (NASDA QPL) and Standard Parts List (NASDA SPL) is available on NASDA's computer network. NASDA is applying a System Reliability Optimization Program (SYROP) based on the parts database to tradeoff parameters

09 RELIABILITY AND QUALITY CONTROL

related to system reliability. NASDA plans for comprehensive parts databases of NASDA standard parts specification. Application data sheet, parts reliability information and device summary sheet are outlined. ESA

N91-32382# Aerospatiale, Cannes (France).

PREPARING ELECTRONICS QUALITY FOR THE NEXT CENTURY

JEAN-CHRISTOPHE FACHON /in ESA, ESA Electronic Components Conference p 571-573 Mar. 1991
Copyright Avail: NTIS HC/MF A25; EPD, ESTEC, Noordwijk, Netherlands, HC 90 Dutch guilders

Total Quality Management (TQM) concepts adapted to the development of quality electronic components are discussed. TQM as applied in the U.S. is contrasted with possible TQM approaches in Europe. The need for the U.S. and Europe to rise to the challenge of Japan's lead in electronic component manufacturing is stressed. Ways in which TQM policies will affect cooperation between the U.S. and Europe are discussed. A TQM approach is predicted to be widespread in Europe four years after it is established in the U.S. ESA

N91-32383# Thomson-CSF, Orsay (France).

EQML: A CHANCE FOR EUROPE

P. CUNY and M. BARRE (MATRA Espace, Paris-Velizy, France) /in ESA, ESA Electronic Components Conference p 575-577 Mar. 1991

Copyright Avail: NTIS HC/MF A25; EPD, ESTEC, Noordwijk, Netherlands, HC 90 Dutch guilders

The European qualification, approval or capability approval system is found to be poorly adapted to Very Large Scale Integration (VLSI) and Application Specific Integrated Circuits (ASICs). EQML, a European qualification system based on the QML system developed by the U.S. Department of Defense, is described. EQML content in terms of qualification and task definition in integrated circuit manufacturing is discussed. The procedure allows qualifications to be carried out by tradeoffs provided that the interfaces are controlled. ESA

N91-32384# Texas Instruments France, Villeneuve-Loubet. Quality Dept.

SPACE MANUFACTURING QUALITY THROUGH STATISTICAL PROCESS CONTROL: AN APPLICATION AT TEXAS INSTRUMENTS FRANCE, A SPACE SEMICONDUCTORS PRODUCTION LINE

JEAN-PAUL ANDRISI and FREDERIC ARTUPHEL /in ESA, ESA Electronic Components Conference p 579-585 Mar. 1991

Copyright Avail: NTIS HC/MF A25; EPD, ESTEC, Noordwijk, Netherlands, HC 90 Dutch guilders

Ways in which Statistical Process Control (SPC) can ensure continuous quality improvements, minimize the cost of ownership and generate a total quality environment for all manufacturing and quality control employees are outlined. Cpk and ppm defect rate dependency are discussed. A review of specific examples of SPC technique implementation in space semiconductors production shows how continuous quality improvements support specific space market needs. Two major applications are analyzed: (1) the enhancement of internal wire bonding process quality via SPC driven process improvement, and (2) how wafer manufacturing internal process control data can be used as a substitute for MIL STD 883 method 2010 internal visual inspections procedures. ESA

N91-32385# Thomson-CSF, Sainte Egreve (France).

TOTAL QUALITY MANAGEMENT: WHAT ARE THE FACTS BEHIND THE CONCEPTS?

J. BLANCHART /in ESA, ESA Electronic Components Conference p 587-588 Mar. 1991

Copyright Avail: NTIS HC/MF A25; EPD, ESTEC, Noordwijk, Netherlands, HC 90 Dutch guilders

The MIL-I-38535 Total Quality Management (TQM) system is discussed. It is concluded to be the most pragmatic TQM system for the manufacturing of military and space Very Large Scale

Integration (VLSI). Changes in manufacturers responsibility due to the system are discussed. The effect of the TQM system on quality improvement programs is discussed. A normalized reliability philosophy based on the TQM system is discussed. Shortcomings of the MIL-I-38535 system in certain TQM areas are identified and ways in which manufacturers can get around these shortcomings are described. ESA

N91-32386# Thomson-CSF, Orsay (France).

WHICH POSITION FOR MIL-SPACE INDUSTRY FACING QML CONCEPT

P. CUNY and M. BARRE (MATRA Espace, Paris-Velizy, France) /in ESA, ESA Electronic Components Conference p 589-594 Mar. 1991

Copyright Avail: NTIS HC/MF A25; EPD, ESTEC, Noordwijk, Netherlands, HC 90 Dutch guilders

Use of the European Quality Management system EQML by part manufacturers, equipment manufacturers and system users is discussed. Evolution of normalized qualification standards enabling better confidence and cost efficiency in new product generation is discussed. Ways of improving development cycles, yields and product performances using the EQML system are outlined. The main phases involved in the qualification concept are identified. ESA

N91-32389# GEC-Plessey Semiconductors, Lincoln (England).

TECHNOLOGY APPROVAL USING CAPABILITY INDICES

W. J. ANDERSON /in ESA, ESA Electronic Components Conference p 607-610 Mar. 1991

Copyright Avail: NTIS HC/MF A25; EPD, ESTEC, Noordwijk, Netherlands, HC 90 Dutch guilders

Technology approval is offered as an alternative to conventional component approval procedures. Statistical Process Control (SPC) and capability indices are used to demonstrate manufacturing capability. Applied to mandated systematic performance improvement, the procedure is intended to meet and exceed the requirements of current systems. Successful implementation of this standard should result in the products of a demonstrably higher quality and reduced cost in comparison to existing approval systems. Technology approval may be granted only to a manufacturer who has been granted manufacturers approval in accordance with the requirements of a recognized national system. ESA

N91-32582# Los Alamos National Lab., NM.

QUALITY ASSURANCE OF FIELD SCREENING

C. S. LEASURE 1991 4 p Presented at the 18th Annual National Energy Division Conference on Quality Assurance of Field Screening, Boston, MA, 7-11 Oct. 1991

(Contract W-7405-ENG-36)

(DE91-016303; LA-UR-91-2561; CONF-9110169-1) Avail: NTIS HC/MF A01

As the costs of collecting, shipping, and analyzing samples for environmental compliance have increased, ways of reducing those costs have been pursued, including field screening methods. Field personnel have long wanted methods that are portable, easy to use, sensitive for all regulated compounds and elements, and approved for use by all regulators. However, field methods do not currently meet these needs, and thus data quality for these methods must be established. The proper amount of quality assurance on field screening methods cannot be easily standardized or prescribed for all field screening. Many field methods have not been documented sufficiently. To ensure that data of known quality is produced from field methods, the significant aspects of the operation of that method, including performance, must be determined and documented. The DOE's Laboratory Management Branch (EM-532) has initiated a program to assess the numbers and types of field methods both in the literature and available commercially. DOE

LEGALITY, LEGISLATION, AND POLICY

Includes Laws and Legality, Insurance and Liability, Patents and Licensing, Legislation and Government, Regulation, Appropriations and Federal Budgets, Local, National, and International Policy.

A91-10010#**GAMMA RAY OBSERVATORY - THE PRODUCTIVITY PROGRAM**

J. A. GLIKSMAN (TRW Space and Defense Sector, Redondo Beach, CA) AIAA, Space Programs and Technologies Conference, Huntsville, AL, Sept. 25-27, 1990. 6 p.
(AIAA PAPER 90-3542) Copyright

The Gamma Ray Observatory (GRO), one of NASA's 'Great Observatories', is scheduled for shuttle launch in late 1990. In 1983, early in the program, NASA and TRW selected GRO as a model for productivity, and agreed to run the program from the beginning with that commitment in mind. Their approach focused on communications, performance measurement, a productivity incentive clause, relationships with subcontractors, and an individual reward system. This paper describes the success of these efforts and of the Gamma Ray Observatory Program.

Author

A91-10204#**THE GOVERNMENT'S RESPONSE TO THE INTERAGENCY REPORT ON ORBITAL DEBRIS**

JAMES P. AHERN (DOD, Space Policy Directorate, Washington, DC) AIAA, Space Programs and Technologies Conference, Huntsville, AL, Sept. 25-27, 1990. 5 p.
(AIAA PAPER 90-3861)

This paper discusses the report on the implementation of the national policy regarding the creation of space debris, provided by the Interagency Group (Space), together with the results of the review of this report by the Orbital Debris Subcommittee of the AIAA's Space Operations and Support Technical Committee of the draft research plan. As a result of the review, 20 tasks were ear-marked for inclusion as orbital debris research objectives. The paper describes these objectives and the ultimate Orbital Debris Research Plan, which was submitted to the National Space Council Staff in May 1990, and approved in July the same year. I.S.

A91-10907#**THE ROLE OF GOVERNMENT PROPERTY IN THE COMMERCIAL SPACE LAUNCH PROGRAM**

DOUGLAS N. GOETZ (USAF, Institute of Technology, Wright-Patterson AFB, OH) IN: Space Logistics Symposium, 3rd, Colorado Springs, CO, Apr. 30-May 2, 1990, Proceedings. Huntsville, AL, Society of Logistics Engineers, 1990, 5 p.

A comparative analysis is presented of the current government policy on the use, provisioning, insurance and liability, disposition/sale of government property, and policy and procedure set forth in current law. By Public Law 98-575 the government is now obligated to promote economic growth by encouraging the private sector to provide launch services and utilize space for peaceful purposes. The government must also encourage a U.S. expendable launch vehicle industry by simplifying and expediting the issuance of commercial launch licenses and by facilitating the commercial use of government-developed expendable technology for launch vehicles. Details of the policy on providing government property and liability for the damage or destruction of government property under the commercial space launch act are discussed.

R.E.P.

A91-14336**THE TWO FACES OF SECTION 105 - AIRLINE SHIELD OR AIRPORT SWORD**

CALVIN DAVISON and LORRAINE B. HALLOWAY (Crowell and Moring, Washington, DC) Journal of Air Law and Commerce

(ISSN 0021-8642), vol. 56, Fall 1990, p. 93-123. refs

Copyright

Section 105 of the Federal Aviation Act, part of the Airline Deregulation Act of 1978, contains wording which has led to conflicting court interpretations concerning the extent of the airport proprietor's authority. The proprietary powers and rights of airports recognized prior to the adoption of Section 105 are reviewed; the legislative history of Section 105 is examined in an attempt to determine Congress' rationale for promulgating this section; and the case law interpreting Section 105 is analyzed. It is concluded that, while considerable confusion still exists with respect to Section 105, the contours of permissible proprietor actions are beginning to emerge and that proprietors should encounter the least legal resistance in exercising their powers in the areas of ground congestion, terminal access, leasing, reasonable landing fees, and noise and environmental concerns. Proprietors may have more limited powers in such areas as access to airspace, air safety rules, and exclusion of new entrants. L.K.S.

A91-14337**AIRLINE'S RESPONSE TO THE DTPA SECTION 1305 PREEMPTION**

DANIEL PETROSKI (Houston Law Review, TX) Journal of Air Law and Commerce (ISSN 0021-8642), vol. 56, Fall 1990, p. 125-153. refs

Copyright

Section 1305 of the USC 49, enacted by Congress in 1978, preempts state laws that regulate the rates, routes, and services of interstate air carriers. It is noted that, despite this, the majority of states have enacted unfair trade practice statutes (UTPS) that may directly affect the air carrier's rates, routes, and manner in which they perform their services. These UTPS allow plaintiffs to collect not only their actual damage, but also to receive attorney's fees and two or three times the actual damages as a penalty and, if not preempted by section 1305, would subject title IV air carriers to greater liability than previously encountered under general common law theories of liability. The legislative history of section 1305; the definition of rates, routes, and services; and controversies and questions that surround section 1305 are discussed and courses of action that are available if section 1305 preempts state law actions are investigated. L.K.S.

A91-18094**STI AND GOVERNMENT INFORMATION IN THE FEDERAL REPUBLIC OF GERMANY**

HANS G. KLAUS (Gesellschaft fuer Mathematik und Datenverarbeitung mbH, Sankt Augustin, Federal Republic of Germany) Government Information Quarterly (ISSN 0740-624X), vol. 7, no. 4, 1990, p. 441-449. refs

Copyright

About 37 percent of the funds spent in 1987 for research in the Federal Republic of Germany result from government sources. The Federal government's overall annual budget alone totals \$291 billion per year (1989). This makes the government sector an important generator, distributor, and consumer of scientific, technical, and government specific information. This article describes the role of the government in this context and discusses important government policy issues. Author

A91-20775**NEW LEADERSHIP FOR SPACE EXPLORATION**

JAMES J. FRELK (George C. Marshall Institute, Washington, DC), WILLIS HAWKINS, ROBERT JASTROW, WILLIAM A. NIERENBERG, and FREDERICK SEITZ Issues in Science and Technology (ISSN 0748-5492), vol. 7, Winter 1991, p. 82-86. refs

Copyright

In March, 1990, the Bush administration released guidelines for the Space Exploration Initiative (SEI), which will stress novel approaches to the development of innovative technologies with a view to major cost, schedule, and performance improvements. It is presently suggested that overall responsibility for SEI efforts be vested in a national commission composed of leaders from the

aerospace industry, universities, and former managers of large technical programs; its leader would report to the President, or to the chairman of the National Space Council, but to no lower level of authority. In this way, proposals originating within NASA would compete on an equal footing with all others, rather than possessing unfair advantage. The more recent management practices of NASA are contrasted with the paradigmatic success of the U.S. Navy's Polaris development program and the early phases of the USAF ICBM development program. O.C.

A91-27566

CAN SPACE EXPLORATION SURVIVE THE END OF THE COLD WAR?

BRUCE MURRAY (California Institute of Technology, Pasadena) Space Policy (ISSN 0265-9646), vol. 7, Feb. 1991, p. 23-34. Copyright

The achievements in space exploration since 1986 are reviewed. It is argued that the first age of space exploration was driven by competition between the U.S. and the USSR. With the apparent close of the Cold War, it is possible that a necessary shift of attention to domestic issues in most nations will cause a hiatus in space exploration. It is thus suggested that a future space exploration program of proper proportion will only be achieved if international cooperation is achieved on a large scale and backed by the necessary political will. It is also suggested that a Mars mission can provide a focus for space exploration well into the next century. L.K.S.

A91-27828

AIRLINE DEREGULATION AND LAISSEZ-FAIRE MYTHOLOGY - ECONOMIC THEORY IN TURBULENCE

PAUL STEPHEN DEMPSEY (Denver, University, CO) Journal of Air Law and Commerce (ISSN 0021-8642), vol. 56, Winter 1990, p. 305-412. refs Copyright

The effect of airline deregulation on the airline industry, its customers, and on the U.S. air transportation system is examined. The actual experience of the last decade is compared with the promises that were made by those who successfully promoted the Airline Deregulation Act of 1978. It is shown that, after a decade of airline deregulation, concentration of national and regional market power is greater, routes are more circuitous, service is poorer, labor-management relations have deteriorated, and air travel is less safe. A legislative agenda for reform is proposed which attempts to steer a middle course between heavy-handed regulation and laissez-faire. The agenda includes the establishment of an independent Federal Transportation Commission, the prohibition of a single airline maintaining a dominant position at more than a single airport, price regulation to prevent price gouging and predatory pricing, and laws aimed at eliminating price discrimination. C.D.

A91-38935#

LEGAL PROBLEMS OF DEVELOPING COUNTRIES' ACCESS TO SPACE LAUNCH VEHICLES

STEPHEN E. DOYLE (Aerojet TechSystems, Sacramento, CA) IN: Space commercialization: Launch vehicles and programs; Symposium on Space Commercialization: Roles of Developing Countries, Nashville, TN, Mar. 5-10, 1989, Technical Papers. Washington, DC, American Institute of Aeronautics and Astronautics, Inc., 1990, p. 132-139. refs Copyright

Launch services are available from multiple sources on a commercial, cost-reimbursable basis. Entities in developing countries seeking launch services for space applications or space science missions will discover a morass of complex legal issues involved in arranging a launch. The single best method to ease the difficulty of arranging a launch contract is to obtain the services of qualified, informed, and experienced legal counsel, capable of functioning in the legal system(s) involved in the particular launching arrangements. Establishing a detailed checklist in advance of contract negotiations can be an enormous help to the first-time entrant into launch contract arrangements. Author

A91-45448

TAXATION IN THE FIELD OF INTERNATIONAL AIR TRANSPORT - LEGAL ASPECTS

R. I. R. ABEYRATNE (Air Lanka, Ltd., Colombo, Sri Lanka) Air Law (ISSN 0165-2079), vol. 16, June 1991, p. 106-117. refs Copyright

The taxation policies of ICAO in the field of civil international air transport are reviewed. Attention is given to ICAO's legal role, academic views and judicial decisions, and legal measures to be taken. Two fundamental postulates that result from these discussions are that taxation is principally used to pay for public services and that there are coherent guidelines as introduced by ICAO Resolutions of November 14, 1966 relating to the taxation of international air transport. Consideration is given to certain legal aspects of IATA, the London Convention of 1939, and the Chicago Convention of 1944. R.E.P.

A91-45449

BERMUDA BIAS - SUBSTANTIAL OWNERSHIP AND EFFECTIVE CONTROL 45 YEARS ON

MARC L. J. DIERIKX (Catholic University, Nijmegen, Netherlands) Air Law (ISSN 0165-2079), vol. 16, June 1991, p. 118-124. refs Copyright

This review serves to illustrate that restrictions on ownership and control, both on an international (bilateral) and on a national level, originated as protective instruments with the primary objective of safeguarding national security. When compared to the granting of air transport rights by sovereign governments, the joint questions of ownership and control seem to hold real possibilities of being separated from the public law framework they are now tied in with. It is suggested that, if present civil air transport is accepted to be an ordinary economic activity offering services to the general public, there appears to be little reason for keeping international air transport in a singular position of governmental patronage. R.E.P.

A91-45450

TWO RECENT GERMAN CASES OF PRIVATIZATION - AIR TRAFFIC CONTROL AND THE SPACE AGENCY

STEFAN A. KAISER Air Law (ISSN 0165-2079), vol. 16, June 1991, p. 125-132. refs Copyright

A comparison is presented that illustrates two approaches to privatization and obstacles to it associated with the German space agency (DARA) and Germany's air traffic services. Consideration is given to the reasons for privatization, the legislative procedure, and the position of the German federal President. The establishment of DARA under private law and the Act on the Transfer of Administrative Competences in the Field of Space Activities are also considered. R.E.P.

A91-47575

THE EXPLOITATION OF SPACE AND DEVELOPING COUNTRIES (INTERNATIONAL-LAW PROBLEMS) [OSVOENIE KOSMOSA I RAZVIVAIUSHCHIESIA STRANY /MEZHDUNARODNO-PRAVOVYE PROBLEMY/]

VLADIMIR M. POSTYSHEV Moscow, Izdatel'stvo Nauka, 1990, 192 p. In Russian. refs Copyright

The contribution of developing countries to the creation of an international legal order in the domain of space activities is discussed. Particular attention is given to the organization of international collaboration in the interests of the peaceful exploration and exploitation of space. The following areas of such exploitation are considered: the remote sensing of earth resources, direct TV broadcasting, the utilization of the geostationary orbit, and the exploitation of lunar resources. L.M.

A91-48028* National Air and Space Museum, Washington, DC. SELLING THE SPACE TELESCOPE - THE INTERPENETRATION OF SCIENCE, TECHNOLOGY, AND POLITICS

ROBERT W. SMITH (National Air and Space Museum, Washington,

DC) IN: A spacefaring nation - Perspectives on American space history and policy. Washington, DC, Smithsonian Institution Press, 1991, p. 29-62. refs

(Contract NASW-3691; NSF SES-85-10336)

Copyright

Attention is given to the politics of initiating the Space Telescope program and to the manner in which the coalition, or working consensus, for the Telescope was assembled, in particular, the role played by astronomers. It is contended that what ensued was a case study in the influence of government patronage on a large-scale scientific and technological program. It is concluded that while a politically feasible Space Telescope did result, in the selling process the Telescope had been both oversold and underfunded. P.D.

A91-48445

THE 1986 CHALLENGER DISASTER - LEGAL RAMIFICATIONS

PAUL G. DEMBLING and RICHARD C. WALTERS (Schnader, Harrison, Segal and Lewis, Washington, DC) Journal of Space Law, vol. 19, no. 1, 1991, p. 1-15. refs

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Analysis and comment on the distinct legal ramifications of the 1986 Challenger disaster are presented. Special attention is given to the role this tragedy might have played in the continuing evolution of two theories, the Feres Doctrine and the Government Contractor Defense, regarding the extent of the liability imposed on the Federal Government and the private concerns which work under its contract. V.I.

A91-48446

THE COMMERCIAL DEVELOPMENT OF SPACE - THE NEED FOR NEW TREATIES

BIN CHENG (Detroit, University, MI) Journal of Space Law, vol. 19, no. 1, 1991, p. 17-44. refs

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In view of present and future commercial developments in outer space, the need for further treaties now required - or urgently required - is examined. Some aspects reviewed here include: the relevance of international law for commercial space activities, the need to delimit airspace, the need to regularize the status of space objects in foreign airspace, peaceful purposes, the status of space objects, space objects and jurisdiction, the extension of national laws to space, dispute settlement, international civil space organization and an international regime for the moon, and conditions governing international rule-making. V.I.

A91-52225* American Univ., Washington, DC.

THE SPACE STATION DECISION - INCREMENTAL POLITICS AND TECHNOLOGICAL CHOICE

HOWARD E. MCCURDY (American University, Washington, DC) Research supported by NASA; Baltimore, MD, Johns Hopkins University Press, 1990, 298 p. refs

(Contract NASW-4067)

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Using primary documents and interviews with participants, this book describes the events that led up to the 1984 decision that NASA should build a permanently occupied, international space station in low earth orbit. The role that civil servants in NASA played in initiating the program is highlighted. The trail of the Space Station proposal as its advocates devised strategies to push it through the White House policy review process is followed. The critical analysis focuses on the way in which 'incrementalism' (the tendency of policy makers to introduce incremental changes once projects are under way) operated in connection with the Space Station program. The book calls for a commitment to a long-range space policy. B.J.

A91-52755

ANTITRUST IRRELEVANCE IN AIR TRANSPORTATION AND THE RE-DEFINING OF PRICE DISCRIMINATION

LAURENCE E. GESELL and MARTIN T. FARRIS (Arizona State University, Tempe) Journal of Air Law and Commerce (ISSN

0021-8642), vol. 57, Fall 1991, p. 173-197. refs

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It is argued that the consolidation of the airline industry into an oligopoly has not enhanced the need for effective antitrust enforcement. Oligopolistic companies tend not to engage in predatory pricing because they know that their competitors will meet the price, lowering profits for all. Instead of more antitrust enforcement, what is needed is a new adaptive law to protect the consumer from unfair price discrimination. C.D.

N91-13366# Commerce Dept., Washington, DC. Office of the Secretary.

REPORT TO THE CONGRESS FROM THE SECRETARY OF COMMERCE ON THE NATIONAL TECHNICAL INFORMATION SERVICE Annual Report, FY 1989

1989 62 p

(PB90-238569) Avail: NTIS HC/MF A04 CSCL 05/2

Legislation passed in 1988 authorized the National Technical Information Service (NTIS) to 'modernize' its operations, make use of cooperative agreements with the private sector, and provided for stronger representation in technology issues both in the United States and abroad. The 1989 Annual Report details NTIS progress. The major areas covered include: modernization; increasing and expanding the collection; foreign technology; audit results; the private sector; and technology transfer. Y.S.

N91-13376# Committee on Commerce, Science, and Transportation (U.S. Senate).

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION AUTHORIZATION ACT, FISCAL YEAR 1991

ERNEST F. HOLLINGS Washington GPO 1990 53 p Report to accompany S. 2287 presented by the Committee on Commerce, Science, and Transportation, 101st Congress, 2d Session, 11 Sep. 1990

(S-REPT-101-455; GPO-39-010) Avail: Document Room, Senate, Washington, DC 20510 HC free

The Senate committee on Commerce, Science, and Transportation presents the NASA Authorization Act for fiscal 1991. This act authorizes appropriations to NASA for research and development, space flight, control and data communications, construction of facilities, research and programs management, and many aspects of the Space Transportation System. M.G.

N91-13377# Committee on Science, Space and Technology (U.S. House).

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION MULTIYEAR AUTHORIZATION ACT OF 1990

ROBERT A. ROE Washington GPO 26 Sep. 1990 82 p Report to accompany H.R. 5649 presented by the Committee on Science, Space, and Technology, 101st Congress, 2d Session, 26 Sep. 1990

(H-REPT-101-763; GPO-39-006) Avail: Document Room, House of Representatives, Washington, DC 20515 HC free

The House of Representatives' Committee on Science, Space, and Technology presents the NASA Multiyear Authorization Act of 1990. The act authorizes appropriations for research and development, space flight, control and data communications, construction of facilities, research and program management, and many aspects of the Space Transportation System. M.G.

N91-13797# Department of Energy, Washington, DC. Office of Coal, Nuclear, Electric and Alternate Fuels.

SOLAR COLLECTOR MANUFACTURING ACTIVITY, 1988

30 Nov. 1989 47 p

(DE90-003539; DOE/EIA-0174(88)) Avail: NTIS HC/MF A03

This report was prepared by the Energy Information Administration, the independent statistical and analytical agency within the U.S. Department of Energy in cooperation with the Office of Conservation and Renewable Energy. The report presents data on producer shipments and end uses obtained from manufacturers and importers of solar thermal collectors and photovoltaic modules. It provides annual data necessary for the Department of Energy to execute its responsibility to: (1) monitor activities and trends in

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the solar collector manufacturing industry, (2) prepare the national energy strategy, and (3) provide information on the size and status of the industry to interested groups such as the U.S. Congress, government agencies, the Solar Energy Research Institute, solar energy specialists, manufacturers, and the general public. DOE

N91-17826# Executive Office of the President, Washington, DC.
PUBLICATIONS OF THE EXECUTIVE OFFICE OF THE PRESIDENT, JANUARY 20, 1981 - JANUARY 20, 1989

1990 11 p

(PB90-199563) Avail: NTIS HC/MF A03 CSCL 05/2

Publications of the Executive Office of the President during the Reagan Administration are compiled. Reports from Council of Economic Advisers, Council on Environmental Quality, Office of Administration, Office of Management and Budget, Office of Science and Technology Policy, Office of the United States Trade Representative, Office of the Vice President, and White House Office are presented. Y.S.

N91-17827# Executive Office of the President, Washington, DC.
PUBLICATIONS OF THE EXECUTIVE OFFICE OF THE PRESIDENT, JANUARY 20, 1989 - JUNE 30, 1990

1990 7 p

(PB90-215641) Avail: NTIS HC/MF A02 CSCL 05/2

Publications of the Executive Office of the President during the Bush Administration are compiled. The reports from Council of Economic Advisers, Council on Environmental Quality, Office of Administration; Office of Management and Budget, Office of National Drug Control Policy, Office of Science and Technology Policy, Office of the United States Trade Representative, and White House Office are presented. Y.S.

N91-19970# Office of Science and Technology, Washington, DC.

US TECHNOLOGY POLICY: EXECUTIVE OFFICE OF THE PRESIDENT

26 Sep. 1990 17 p

(PB91-119677) Avail: NTIS HC/MF A03 CSCL 05/1

A statement of the Administration's technology policy is presented. Many facets of technology policy are brought together, and it is shown how they fit into a comprehensive framework. The goals and strategies of this policy are discussed. The program implementation proposed in the Administration's Fiscal Year 1991 budget submittal to Congress is presented. Areas associated with classified national security technologies are not included. A nation's technology policy is based on the broad principles that govern the allocation of its technological resources. Competitive market forces determine, for the most part, an optimal allocation of U.S. technological resources. Government can nonetheless play an important role by supplementing and complementing those forces. Y.S.

N91-21008# Congress of the United States, Washington, DC.
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION AUTHORIZATION ACT, FISCAL YEAR 1991

Washington GPO 16 Nov. 1990 21 p S. 2287 enacted into law by the 101st Congress, 2d Session, 16 Nov. 1990

(PUB-LAW-101-611) Avail: Document Room, Senate, Washington, DC 20510 HC free; also available SOD HC \$1.00 as 869-010-00371-4

Text is presented of the public law authorizing appropriations to the National Aeronautics and Space Administration for research and development; space flight, control, and data communications; construction of facilities; research and program management; and for other purposes. Author

N91-23977 Washington Univ., Seattle.

ACCESS AND EFFICIENCY IN REAGAN-ERA INFORMATION POLICY: A CASE STUDY OF THE ATTEMPT TO PRIVATIZE THE NATIONAL TECHNICAL INFORMATION SERVICE Ph.D. Thesis

ROBERT KEITH STEWART 1990 310 p
Avail: Univ. Microfilms Order No. DA9104302

This case study of public policy debate was undertaken to learn more about how information policy is made in the United States. The question of how guiding philosophies of government shape Federal information resources management policy (FIRMP) is addressed. By the mid-1980's, there was an apparent shift in the direction of FIRMP away from ideas of access and toward the idea of efficiency. The attempted privatization of the National Technical Information Service (NTIS) case study was used to try to learn how important the ideas of efficiency and access were to the policy makers as they determined whether to model Federal information policy according to a library or warehouse metaphor. After several attempts on the part of the Reagan Administration to privatize NTIS, the Office of Management and Budget in early 1987 instructed the Department of Commerce to formulate a process whereby NTIS would be privatized. DoD assembled a task-force comprised of Commerce, NTIS, and Office of Management and Budget personnel. The role that policy makers see the Federal Government playing in matters of acquiring and disseminating information in the late 1980's is addressed. In addition, the process of policy-making at the Federal level, and the impact that the process can have on policy decisions are examined. Of particular interest is the ability or inability of policy makers to engage in discourse relative to the central issues in the policy debate. It is demonstrated that a view in progress approach can reveal: (1) much about the policy-making process that might otherwise be hidden from historians or researchers who rely on printed documents; (2) that guiding philosophies about government and information do not solely determine the outcome of such policy debates; and (3) that policy can be shaped by staff-level government workers in the legislative and executive branches of government. Dissert. Abstr.

N91-24956# Sandia National Labs., Albuquerque, NM.
TECHNOLOGY TEAMWORK: THE ROLE OF THE NATIONAL LABORATORIES IN IMPLEMENTING US TECHNOLOGY POLICY

A. NARATH, G. YONAS, and B. C. DALE Mar. 1991 8 p

(Contract DE-AC04-76DP-00789)

(DE91-010017; SAND-91-0408) Avail: NTIS HC/MF A02

In September 1990, the President's Office of Science and Technology released a document that bears on the future of our nation's technological vigor and economic performance. Entitled, U.S. Technology Policy, it is a statement of a set of broad principles that will constitute the Federal government's technology policy for the 1990s. One of the leading principles of this policy is the imperative for cooperation and teamwork among government, industry, and academia, including an active, partnership role for the national laboratories in the mainstream U.S. technology community. Until now, the nation's technology policy has never been explicit, although a tacit technology policy of one sort or another has at all times been in effect. The Federal government has consistently been willing to create and fund institutions and programs to promote important national technology goals. Historical examples of such sponsorship include atomic energy, agriculture, aeronautics and space, energy, and medicine. The recognition in U.S. Technology Policy that government has an active role to play in fostering technology development is a particularly significant admission. The vision of a partnership between the Federal government and the private sector, as the policy outlines, provides a foundation upon which the national laboratories of the Department of Energy (DOE) can build to play a stronger role in enhancing U.S. economic competitiveness. DOE

N91-28196*# Aerospace Industries Association of America, Inc., Washington, DC.

MAINTAINING TECHNICAL EXCELLENCE REQUIRES A NATIONAL PLAN

T. F. DAVIDSON /in NASA, Washington, Space Transportation Propulsion Technology Symposium. Volume 2: Symposium Proceedings p 69-84 May 1991

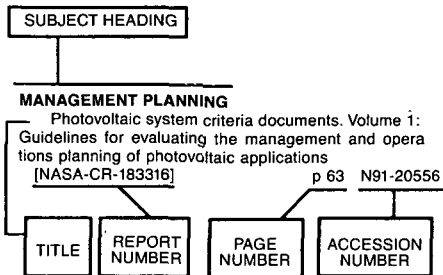
Avail: NTIS HC/MF A99 CSCL 21/8

To meet the challenge of technical excellence, AIA established a rocket propulsion committee to develop the National Rocket

Propulsion Strategic Plan. Developing such a plan required a broad spectrum of experience and disciplines. The Strategic Plan team needed the participation of industry, government, and academia. The plan provides, if followed, a means for the U.S. to maintain technical excellence and world leadership in rocket propulsion. To implement the National Rocket Propulsion Strategic Plan is to invest in the social, economic, and technological futures of America. The plan lays the basis for upgrading existing propulsion systems and a firm base for future full scale development, production, and operation of rocket propulsion systems for space, defense, and commercial applications.

Author

Typical Subject Index Listing



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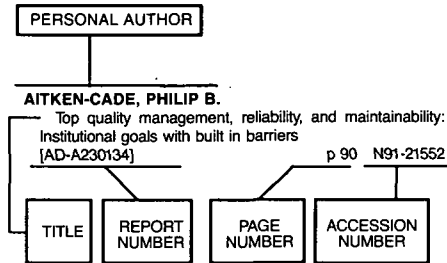
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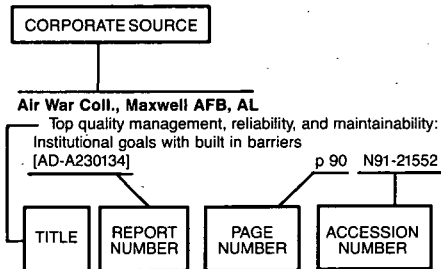
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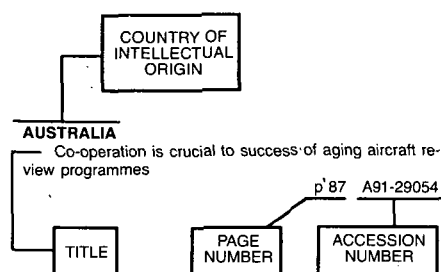
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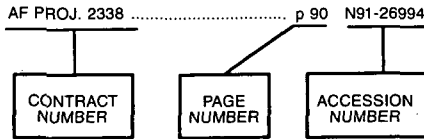
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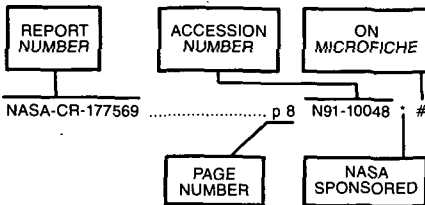
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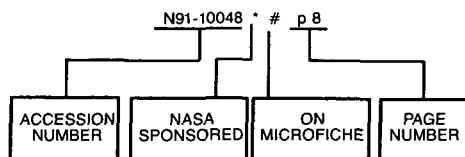
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